

# PATENT ABSTRACTS OF JAPAN

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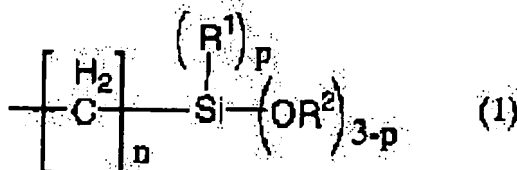
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## (54) RESIN COMPOSITION FOR SEALING LIQUID CRYSTAL AND LIQUID CRYSTAL DISPLAY ELEMENT

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a composition for sealing a liquid crystal simultaneously satisfying (1) to have excellent liquid crystal non-contamination properties, (2) to conform to the photo-curing system nearly free from liquid crystal deterioration, (3) to be photo-cured by photo irradiation with a low dose, (4) to be cured at a light-shielded part, (5) to have excellent shelf stability, coating reliability and adhesion properties and (6) to bring the liquid crystal display element having high display quality and excellent long term reliability.

**SOLUTION:** The resin composition for sealing the liquid crystal consists of 80 to 98.9% by mass of a liquid (meth)acrylate having 0.01 to 2% by mass of a silyl group-modified alkyl group represented by formula (1) expressed in terms of a silicon atom content and  $1 \times 10^6$  to  $9 \times 10^{15} \Omega\text{cm}$  specific resistance, 0.1 to 10% by mass of a radical photo initiator (2) and 0.01 to 10% by mass of an organic peroxide (3).



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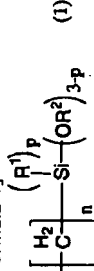
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## CLAIMS

[Claim(s)]

[Claim 1] (1) the following type -- (1) [-izing 1]

[Formula 1]



(As for R2, n expresses among a formula the aliphatic hydrocarbon radical in which R1 may have [ integer / of 0 thru/ or 2 ] a carbon number 1 thru/ or branching of 8 in a carbon number 1 thru/ or the aliphatic hydrocarbon radical of 8, or a phenyl group as for p for the integer of 2 thru/ or 3.)

Liquefied (meta) acrylate which comes out and has the range of 0.01 thru/or 2 mass %, and resistivity in the range of 1x10<sup>6</sup> thru/or 9x10<sup>15</sup> ohm-cm with the value expressed with the mass % of a silicon atom in the silyl radical denaturation alkyl group shown 80 thru/or 98.9 mass % (2) radical photoinitiator 0.1 thru/or 10 mass % (3) organic peroxide Resin constituent for the liquid crystal closures which consists of 0.01 thru/or 10 mass %.

[Claim 2] They are (4) elastomers in the aforementioned resin constituent for the liquid crystal closures. Resin constituent for the liquid crystal closures according to claim 1 characterized by making 1 thru/or 30 mass % contain.

(Claim 3) the inside of the aforementioned resin constituent for the liquid crystal closures -- the (5) maximum particle diameter -- a bulking agent 5 micrometers or less and/or (6) gap appearance -- carrying out -- grant agent Resin constituent for the liquid crystal closures according to claim 1 or 2 characterized by making 0.1 thru/ or 30 mass % contain.

(Claim 4) They are (7) silane coupling agents to the aforementioned resin constituent for the liquid crystal closures. Resin constituent for the liquid crystal closures according to claim 1 characterized by making 0.1 thru/or 3 mass % contain.

[Claim 5] They are (8) waxes to the aforementioned resin constituent for the liquid crystal closures. Resin constituent for the liquid crystal closures according to claim 1 to 4 characterized by making 0.1 thru/or the 3 mass % section contain.

(Claim 6) They are (9) radical-polymerization inhibitor and/or a (10) transition-metals non-\*\*\* agent to the aforementioned resin constituent for the liquid crystal closures. Resin constituent for the liquid crystal closures according to claim 1 to 5 characterized by making 0.001 thru/or mass % contain.

(Claim 7) The resin constituent for the liquid crystal closures according to claim 2 to 6 characterized by for the aforementioned (4) elastomers being particles and the particle size being 0.1 thru/ or 5 micrometers.

**[Claim 8]** The resin constituent for the liquid crystal closures according to claim 7 characterized by the aforementioned (4) elastomers being acrylic rubber or silicone rubber.

(Claim 9) The aforementioned liquefied meta (acrylate) the silyl radical denaturation alkyl group shown by said formula (1) with the value expressed with content mass % of a silicon atom 0.1 thru/ or the range of 2 mass %. And volume proper resistivity is in the range of 1x10<sup>8</sup> thru/ or

9x1014 ohm-cm. It is the resin constituent for the liquid crystal closures of a publication either to claim 1 characterized by the number average molecular weight having one sort of molecule frames which are in the range of 300 thru/ or 10000, and were chosen as intramolecular from bisphenol A, Bisphenol F, and Bisphenol MD thru/ or 8.

[Claim 10] The resin constituent for the liquid crystal closures according to claim 1 to 9 characterized by the aforementioned (2) radical photoinitiator being a light active type radical photoinitiator.

[Claim 11] The resin constituent for the liquid crystal closures according to claim 10 characterized by the aforementioned (2) radical photoinitiator showing activity with the light of 390 - 420nm wavelength.

[Claim 12] The resin constituent for the liquid crystal closures according to claim 1 to 9 characterized by the aforementioned (3) organic peroxide being cumene hydroperoxide.

[Claim 13] glass [ the inside of the opposite substrate which faces, and one of ] --- and --- or to the junction seal configuration part of the substrate for liquid crystal display cells made from plastics To claim 1 thru/or claim 12, either After applying the liquid crystal closure resin constituent of a publication in the shape of a frame, Furthermore, the liquid crystal of mass required for a liquid crystal display cel configuration is dropped at one arbitrary locations of a seal within the limit of the liquid crystal display cel configuration substrate in front of lamination. And two substrates which counter are stuck under a high vacuum, the bottom of un-heating --- the back It is stuck by pressure so that it may become a homogeneous cel gap 0.2 thru/or in 7 micrometers. After that, The liquid crystal display cel manufacture approach characterized by manufacturing a liquid crystal display cel through a less than 130-degree C accelerated curing by heating hardening process or a liquid crystal homogeneity reorientation process after passing through the process which makes ultraviolet rays or the light irradiate from outside, and stiffens the resin constituent for the liquid crystal closures.

[Claim 14] The liquid crystal display component obtained by the manufacture approach of the liquid crystal display cel shown in claim 13.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

- [0001] [Field of the Invention] This invention relates to the resin constituent for the liquid crystal closures which can respond to the liquid crystal dropping seal method which can be hardened at low temperature in more detail about the resin constituent for the liquid crystal closures.
- [0002] [Description of the Prior Art] In recent years, a liquid crystal display panel with the thin lightweight description as a display device came to be used widely. Moreover, to have a cheap and high definition display function with a rise of the spread is desired strongly.
- [0003] By the way, the conventional liquid crystal display panel has been adopted mainly as the manufacture approach with a common empty cel manufacture method. Using a thermosetting sealing-compound constituent, leave the sealing section, carry out the bonded seal of glass [ which arranged suitably a transparent electrode important as a member which constitutes a liquid crystal display component, and the orientation film / transparent ], or the vertical pair substrate made of a plastic to the empty cel manufacture method, and it is made to cel-ize. Later, They are enclosure and a method of sealing by sealer and obtaining a liquid crystal display cel parent so that the liquid crystal may not begin to leak outside still more finally about liquid crystal in this empty cel over several hours by vacuum impregnation. Moreover, in order to carry out a bonded seal in that case, generally a thermosetting epoxy resin constituent is used, for example, the sealing compound used is indicated by JP.57-137317.A, JP.59-157330.A, JP.3-189623.A, JP.5-262850.A, JP.9-318953.A, etc.
- [0004] By the above mentioned empty cel manufacture method, the process was complicated generally, especially the liquid crystal impregnation process to the so-called empty cel for mold liquid crystal displays of the mold corresponding to a high-speed animation of a large-sized panel 10 inches or more corresponding to a narrow gap was presupposed that several hours or more and long duration are required in many cases, and the limitation was in productivity or low cost-ization.
- [0005] Recently, the liquid crystal dropping seal method is proposed as said The means for solving a technical problem, and the sealing-compound constituent of an ultraviolet curing mold, the sealing-compound constituent of the 2 yuan hardening mold of ultraviolet rays and heat hardening, etc. are proposed, respectively as a sealing compound corresponding to the liquid crystal dropping seal method, for example, JP.9-5759.A, JP.2001-133794.A, etc. can be illustrated.
- [0006] According to the liquid crystal dropping method, it is clear to be able to perform cel-ized immobilization by enclosure and the sealing compound of liquid crystal to coincidence, and for things to be made, and to contribute to the simplification and laborsaving of the production process of a liquid crystal display cel greatly.
- [0007] However, a commercial scene is not presented with the liquid crystal display component produced by the liquid crystal dropping seal method using the sealing-compound constituent of the ultraviolet curing mold proposed until now.
- [0008] As the reason, for example, on a cel configuration substrate, as a part which shades

ultraviolet rays Transparent electrodes, such as indium oxide, There are a black mask made from chromium material etc., quite a few protective coats made from the acrylic ingredient. In connection with the problem on manufacture of the seal pass imagined to originate in ultraviolet-rays un-hardening occurring frequently, and the UV irradiation of long duration, liquid crystal deteriorates or the problem on quality, like the display grace of the obtained panel is low is considered as a cause.

[0009]

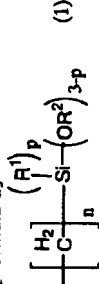
[Problem(s) to be Solved by the Invention] The purpose of this invention is in offer of the resin constituent for the liquid crystal closures which is satisfied with coincidence of following \*\* thru/or \*\*.

- \*\* Excel in liquid crystal non-stain resistance.
  - \*\* Liquid crystal degradation suits few photo-curing systems.
  - \*\* On the occasion of photo-curing, it can harden by the optical exposure of a low dose.
  - \*\* Seal hardening of an optical protection-from-light part is possible.
  - \*\* Excel in preservation stability, spreading dependability, and an adhesive property.
  - \*\* The display grace of the obtained liquid crystal display component is excellent in dependability highly and over a long period of time.
- Furthermore, the purpose of this invention is to offer the liquid crystal display cel manufacture approach with a high-definition display property without the display nonuniformity which used the resin constituent for the liquid crystal closures.
- [0010] The hardening seal which problems, such as liquid crystal leakage and remarkable turbulene of a seal line, hardly generate also in low light quantity of radiation is made in more detail, and it is in offer of the new resin constituent for the liquid crystal closures which can demonstrate heat radical hardenability as a seal hardening function of a protection-from-light part by 80 thru/or 130-degree C low-temperature accelerated curing by heating.
- [0011]
- [Means for Solving the Problem] this invention person etc. completed a header and this invention for solving the above-mentioned technical problem by making it an elastomer, a bulking agent, and the constituent that carries out gap appearance and makes the specific range a control agent, a wax, radical polymerization inhibitor, and a transition-metals non-\*\* agent, respectively specific radical polymerization nature resin, a specific radical photoinitiator, specific organic peroxide, and if needed.
- [0012]

[Embodiment of the Invention] the resin constituent for the liquid crystal closures of this invention -- the (1) following type -- (1 [-izing 2])

[0013]

[Formula 2]



(As for R2, n expresses among a formula the aliphatic hydrocarbon radical in which R1 may have [ integer / of 0 thru/or 2 ] a carbon number 1 thru/or branching of 8 in a carbon number 1 thru/or the aliphatic hydrocarbon radical of 8, or a phenyl group as for p for the integer of 2 thru/or 3.)

Liquefied meta which comes out and has the range of 0.01 thru/or 2 mass %, and resistivity in the range of 1x106 thru/or 9x1015 ohm-cm with the value expressed with content mass % of a silicon atom in the thyl radical denaturation alkyl group shown (acrylate) 80 thru/or 99.9 mass % (2) radical photoinitiator 0.1 thru/or 10 mass % (3) organic peroxide It is the resin constituent for the liquid crystal closures which consists of 0.01 thru/or 10 mass %.

[0014] In addition, by the following explanation, the range of 0.01 thru/or 2 mass % and volume proper resistivity may only name generically the liquefied meta (acrylate) in the range of 1x106 thru/or 9x1015 ohm-cm (1) liquefied (meta) acrylate with the value expressed with content mass

% of a silicon atom in the activity silyl radical denaturation alkyl group shown by said formula (1).  
Moreover, the aforementioned resin constituent for the liquid crystal closures which consists of (1) thru/or (3) may only be called the resin constituent for the liquid crystal closures (A) by the following publications.

[0015] Moreover, with the resin constituent for the liquid crystal closures of this invention, they are (4) elastomers to resin constituent 100 mass % for the liquid crystal closures in the resin constituent for the liquid crystal closures (A). It is good to consider as the becoming resin constituent for the liquid crystal closures (B) which makes 1 thru/or 30 mass % contain. moreover, more preferably, the (5) maximum particle diameter carries out a bulking agent 5 micrometers or less and/or (6) gap appearance into the resin constituent for the liquid crystal closures (A), or the resin constituent for the liquid crystal closures (B), and the resin constituent for the liquid crystal closures (C) which makes it come to contain the grant agent 0.1 thru/or 30 mass % is mentioned.

[0016] Moreover, it is still more desirable to consider as the resin constituent for the liquid crystal closures (D) which makes it come to 100 mass % [ in a resin constituent ] % for 1 sort of liquid crystal closures further chosen in the resin constituent for the liquid crystal closures of this invention into one sort of resin constituents for the liquid crystal closures chosen from the resin constituent for the liquid crystal closures (A) thru/or (C) to contain 0.1 thru/or 3 mass % of (7) silane coupling agents.

[0017] Moreover, it is still more desirable to consider as the resin constituent for the liquid crystal closures (E) which makes it come to 100 mass % [ in a resin constituent ] % for 1 sort of liquid crystal closures further chosen in the resin constituent for the liquid crystal closures of this invention into one sort of resin constituents for the liquid crystal closures chosen from the resin constituent for the liquid crystal closures (A) thru/or the resin constituent for the liquid crystal closures (D) to contain 0.1 thru/or 3 mass % of (8) waxes.

[0018] The resin constituent for the liquid crystal closures (F) which makes it come still more preferably to contain (9) radical-polymerization inhibitor and/or the (10) transition-metals non- \*\* agent 0.001 thru/or 1 mass % in one sort of resin constituents for the liquid crystal closures chosen from the resin constituent for the liquid crystal closures (A) thru/or (E) is a greatly desirable example.

[0019] Moreover, it is still better that (4) elastomers are particles and the particle diameter is 0.1 thru/or 5 micrometers in the resin constituent for the liquid crystal closures of this invention or that the (4) elastomer is acrylic rubber or silicone rubber again. Moreover, number average molecular weight has (1) liquefied (meta) acrylate resin in the range of 300 thru/or 10000. And containing one sort of molecule frames chosen as intramolecular from bisphenol A, Bisphenol F, and Bisphenol MD, a thing [ (2) radical photoinitiator / a light active type radical photoinitiator ]. Moreover, it is the especially most desirable examples that the (2) radical photoinitiator is what shows activity with the light of 390 - 420nm wavelength, that (3) organic peroxide is cumene hydroperoxide, etc.

[0020] In the resin constituent for the liquid crystal closures of this invention, moreover, the rate of a liquid crystal specific resistance value change after contacting 6 mass % of liquid crystal under 24-hour nitrogen-gas-atmosphere mind to the un-hardening or one mass each % of a hardened material When the original liquid crystal resistivity is set to 1, it is [ 0.1 thru/or the twice as many range as this, ] in less than 1\*\*0.2 times more preferably. The rate of a liquid crystal specific resistance value change after contacting 6 mass % of liquid crystal to one mass each % of the hardened material of the resin constituent for the liquid crystal closures of this invention under 80-degree-C 24-hour nitrogen-gas-atmosphere mind When the original liquid crystal resistivity is set to 1, it is good to carry out selection use of 0.1 thru/or the twice as many range as this, and the object that is in less than 1\*\*0.2 times more preferably.

[0021] In the resin constituent for the liquid crystal closures of this invention, moreover, the rate of a liquid crystal specific resistance value change after contacting 6 mass % of liquid crystal under 24-hour nitrogen-gas-atmosphere mind to the un-hardening or one mass each % of a hardened material When the original liquid crystal resistivity is set to 1, it is [ 0.1 thru/or the twice as many range as this, ] in less than 1\*\*0.2 times more preferably. The rate of a liquid

crystal specific resistance value change after contacting 6 mass % of liquid crystal to one mass each % of the hardened material of the resin constituent for the liquid crystal closures of this invention under 80-degree-C 24-hour nitrogen-gas-atmosphere mind When the original liquid crystal resistivity is set to 1, it is good to carry out selection use of 0.1 thru/or the twice as many range as this, and the object that is in less than 1\*\*0.2 times more preferably. A substantial high definition display function can be given to the liquid crystal display component obtained by doing so, and it is desirable.

[0022] Moreover, with the resin constituent for the liquid crystal closures of this invention, it is good the range of 50 thru/or 500 Pa-s, and to be in the range of 150 thru/or 450 Pa-s preferably with E mold viscosity value, and the dynamic intrinsic viscosity of 25 degrees C is making the initial viscosity property of the range hold, and can demonstrate spreading workability without spreading nonuniformity, and it is desirable. If it is especially the initial viscosity of 150 or more Pa-s, it is desirable from the seal configuration holdout after spreading being excellent. Moreover, if it is the initial viscosity of 450 or less Pa-s, the diameter of a nozzle can secure the dispensing spreading nature of 0.15 thru/or the diameter of 0.5mm, and is desirable. Moreover, the CHIKUSO indexes (below, suppose that it only expresses with a CHIKUSO characteristic, a call, and a notation in TI) expressed with the value which is expressed with the ratio of a 0.5rpm rotation viscosity value / 5rpm rotation viscosity value to coincidence, and which broke the low rotation viscosity value by one 10 times the rotation viscosity value of this like are the range of 0.95 thru/or 5, and the desirable range of 1 thru/or 2 and a desirable example especially with the desirable thing preferably been in the range of 1 thru/or 1.2

[0023] Moreover, it is greatly desirable that the glass transition temperature (Tg) for which it asked from the thermostat mechanical analyzer (TMA) is 20 degrees C or more less than 180 degrees C as a hardening object property of the resin constituent for the liquid crystal closures of this invention. Especially the thing more preferably considered as 30 thru/or the range of 150 degrees C and also 50 thru/or 130 degrees C is desirable. The practical display grace of the liquid crystal display component which will be obtained if Tg is 20 degrees C or more can secure substantially, and is desirable. Moreover, the practical display endurance of the liquid crystal display component which will be obtained if Tg is less than 180 degrees C can secure substantially, and is desirable.

[0024] Moreover, it is desirable that the water absorption expressed with the weight rate of change after boiling water 30-minute immersion is especially 1% or less more preferably 3% or less as a hardening object property of the resin constituent for the liquid crystal closures of this invention. Display driver voltage change of the liquid crystal display component obtained by making water absorption into 3% or less can be substantially made low, and it is desirable. [0025] Moreover, as the non-hardened body of the resin constituent for the liquid crystal closures of this invention, or an electrical property of the hardening object, it is good the range of 1x105 or more ohm/cm, and to be in the range of 1x106 thru/or 9x1012 ohm-cm preferably with a volume resistivity value. If an electrical property is said within the limits, the display printing phenomenon of a liquid crystal display component and display nonuniformity generating which are acquired can be controlled to altitude, and it is desirable.

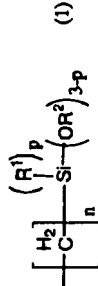
[0026] The component which constitutes the resin constituent for the liquid crystal closures of this invention is explained in order below at a detail.

[0027] <(1) liquefied (meta) acrylate> (1) liquefied (meta) acrylate means the resin constituent which becomes in the ordinary temperature which consists of 0 thru/or 20 mass % of a radical polymerization nature monofunctional monomer described below, and 80 thru/or 100 mass [ of methacrylate oligomer and/or acrylate oligomer (below, it considers as the language which carries out the package generic name of methacrylate oligomer and/or the acrylate oligomer, and acrylate (meta) oligomer is used, ) ] % since liquefied.

[0028] moreover, the (1) liquefied (meta) acrylate --- the following type --- (1 [-izing 3])

[0029]

[Formula 3]



(In p, R1 among a formula a carbon number 1 thru/or the aliphatic hydrocarbon radical of 8, or a phenyl group for the integer of 0 thru/or 2) [ n ] [ the integer of 2 thru/or 3 ] R2 expresses the aliphatic hydrocarbon radical which may have a carbon number 1 thru/or branching of 8. It is indispensable requirements that the range of 0.01 thru/or 2 mass % and resistivity are in the range of 1x106 thru/or 9x1015 ohm-cm with the value expressed with content mass % of a silicon atom about the silyl radical denaturation alkyl group shown. If resistivity is said within the limits, it continues at normal and a long period of time within the driver voltage to which the liquid crystal display component obtained was set beforehand, a display function can be secured, and it is desirable. It is that resistivity is in the range of 1x108 thru/or 9x1014 ohm-cm more preferably.

[0030] As an example of the concrete functional group except the alkylene joint radical of the activity silyl radical denaturation alkyl group shown by said formula (1) Although there is nothing especially at the thing to limit, for example A trimethoxysilyl radical, a triethoxy silyl radical, The thoria RUKOKISHI silyl radical represented by a TORI[PUROPI] oxy-silyl radical, a TORISOPUROPI oxy-silyl radical, the tree n-butoxy silyl radical, etc., Moreover, a dimethoxymethyl silyl radical, a dimethoxy ethyl silyl radical, a dimethoxy propyl silyl radical, A diethoxymethylsilyl radical, a diethoxy ethyl silyl radical, a JIPUROPI oxymethyl silyl radical, A JIPUROPI oxy-ethyl silyl radical, a G SOPUROPI oxymethyl silyl radical, The dialkoxo silyl radical represented by a JIISOPUROPI oxy-ethyl silyl radical, the G n-butoxy methyl silyl radical, etc., A methoxy dimethylsilyl radical, a methoxy diethyl silyl radical, a methoxy dipropyl silyl radical, An ethoxy dimethylsilyl radical, an ethoxy diethyl silyl radical, an ethoxy dipropyl silyl radical, a PUROPI oxy-dimethylsilyl radical, a PUROPI oxydiethyl silyl radical, an iso PUROPI oxy-dimethylsilyl radical, an isopropanal PLOKISHI diethyl silyl radical, etc. are mentioned. [0031] With moreover, (1) liquefied (meta) acrylate with the activity silyl radical denaturation alkyl group shown by said formula (1) It means that the thing which comes to hold an alkoxy silanol group as a side-chain functional group is contained not a little in either a radical polymerization nature monofunctional monomer or (meta) acrylate oligomer and both its matter. In more detail The radical polymerization nature monofunctional monomer of alkoxy silanol group content, or the acrylate (meta) oligomer of alkoxy silanol group content, The acrylate (meta) oligomer which does not contain the radical polymerization nature monofunctional monomer or alkoxy silanol group which does not contain the alkoxy silanol group may live together. [0032] Especially as a content of the activity silyl radical (alkoxy silanol group) denaturation alkyl group, although it does not restrain, it is desirable to consider as the range of 0.01 thru/or 2 mass % with the value of the silicon atom occupied in liquefied (meta) acrylate content mass % Expressed. It is 0.1 thru/or 1 mass % more preferably.

[0033] In addition, especially as an approach of calculating a silyl radical denaturation alkyl group content [ activity / in liquefied (meta) acrylate ], although it does not restrain, the approach of wet degradation-elemental-analysis assay, dry destruction-elemental-analysis assay, or incineration residue assay may be adopted, for example.

[0034] < (a radical polymerization nature monofunctional monomer > radical polymerization nature monofunctional monomer means the monomer in which the already well-known monofunctional mold radical polymerization which has one radical polymerization nature partial saturation radical in 1 molecule is possible, and does not have especially limitation.) the monofunctional acrylate and monofunctional methacrylate (the following publications --- the monofunctional acrylate --- and --- or the package generic name of the monofunctional methacrylate is carried out, and it is sometimes only called the monofunctional (meta) acrylate) which are the acrylic acids represented with an acrylic acid or a methacrylic acid (meta) and a derivative of those as an example are mentioned. Furthermore, for example, a maleic anhydride, a maleic acid, itaconic acid anhydride. The monoester or diester guided from one sort of the alkyl

alcohols whose carbon numbers of the partial saturation dicarboxylic acid represented with an itaconic acid, a fumaric acid, etc. and those alkyl groups are 1 of 6 thru/or the 3rd class. Styrene, vinyltoluene, a vinyl phenol, an isopropenyl phenol, The aromatic styrene partial saturation monomers represented with alpha methyl styrene, p-methyl styrene, etc. An allyl compound, the acrylamides represented with acrylamide or methacrylamide (meta), the derivative of those, N-methylacrylamide, the derivative and N-hydroxymethyl acrylamides, N-hydroxyethyl acrylamides, and those alkyl ether ghost derivatives, In addition, an N-vinyl-2-pyrrolidone, acryloyl morpholine, a vinyl imidazole, N-vinyl caprolactam, vinyl acetate, etc. are mentioned as a desirable example.

[0035] As the above mentioned monofunctional (meta) acrylate, as a substituent, methyl, Ethyl, propyl, butyl, amyl, 2-ethylhexyl, octyl, Nonyl, dodecyl, hexadecyl, octadecyl, cyclohexyl, Benzyl, methoxy ethyl, butoxy ethyl, phenoxy ethyl, nonylphenoxyethyl, Tetrahydrofurfuryl, glycidyl, isocyanate ethyl, isocyanate propyl, 2-hydroxyethyl, 2-hydroxypropyl, 3-chloro-2-hydroxypropyl, Dimethylaminoethyl, a diethylaminoethyl, nonylphenoxyethyl tetrahydrofurfuryl, The acrylate which has \*\*\* machines, such as caprolactone denaturation tetrahydrofurfuryl, isobornyl, dicyclopentamyl, JISHIKURO pentenyl, and dicyclopentenyl/oxo ether, (meta) is mentioned. [0036] As desirable monofunctional (meta) acrylate, glycidyl acrylate, glycidyl methacrylate, 2-hydroxyethyl acrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl acrylate, 2-hydroxypropyl methacrylate, isocyanate ethyl acrylate, isocyanate ethyl methacrylate, isocyanate propyl methacrylate, and isocyanate propylacrylate are illustrated.

[0037] As a radical polymerization nature monofunctional monomer which comes to contain the activity silyl radical denaturation alkyl group shown by said formula (1) How to make the isocyanate silane compound of an initial complement act to the radical polymerization nature monofunctional monomer which has a hydroxy group in intramolecular out of the above mentioned radical polymerization nature monofunctional monomer, and introduce a silyl radical denaturation alkyl group [ activity / above ]. Or the radical polymerization nature monofunctional monomer which has a carboxyl group in intramolecular is received. As opposed to the radical polymerization nature monofunctional monomer which the glycidyl silane compound of an initial complement is made to act, and has the amino group of the 1st class and/or the 2nd class in the aforementioned approach of introducing an activity silyl radical denaturation alkyl group and also intramolecular As opposed to the radical polymerization nature monofunctional monomer which has a glycidyl group or an oxirane ring machine in the approach of making the glycidyl silane compound of an initial complement act, and introducing a silyl radical denaturation alkyl group [ activity / above ], and intramolecular How to make the amino silane compound of an initial complement act, and introduce a silyl radical denaturation alkyl group [ activity / above ]. Or the radical polymerization nature monofunctional monomer which has an isocyanate radical in intramolecular is received. It is represented by what was obtained by either, such as the approach of making the amino silane compound and/or mercapto silane compound of an initial complement act, and introducing a silyl radical denaturation alkyl group [ activity / above ], and is good as those one sort or two sorts or more.

[0038] What is necessary is just to carry out, for example especially as an approach of asking for the class and its content rate of a radical polymerization nature monofunctional monomer in the resin constituent for the liquid crystal closures in the condition of this application of not hardening, combining suitably the solvent extraction isolating method, an NMR spectrum method of identification, the gas chromatography method, the distillation isolating method, etc., although it does not restrain, moreover, the sealing-compound hardening --- as an approach of asking for the class and its content rate of a radical polymerization nature monofunctional monomer in the living body, you may carry out, for example, combining suitably the cracked gas chromatography-mass-spectrum method, the solid-state NMR method, etc. (1) It is good in liquefied (meta) acrylate to make said radical polymerization nature monofunctional monomer contain in the range of 3 thru/or 10 mass % preferably especially below 10 mass % below 20 mass %.

[0039] <(meta) acrylate oligomer> (meta) acrylate oligomer already means the acrylate oligomer compound in which a well-known polyfunctional radical polymerization is possible (meta), and there is especially no limitation. The range of 300 thru/or 10000 and considering as the range of

350 thru/or 8000 and the multiple-valued (meta) acrylate which is in the range of 350 thru/or 5000 preferably especially have the still more desirable more preferably mass average molecular weight expressed with the polystyrene conversion molecular weight preferably calculated from liquid chromatography analysis (only referred to as GPC below), the liquid crystal sealing-compound constituent carries out real reservation and has desirable compatibility and bonded seal dependability with a liquid crystal display cel substrate side at the same time the sealing-compound constituent which is excellent in difficulty volatility that mass average molecular weight considers as 300 or more multiple-valued (meta) acrylate (the out generation of gas -- few) is obtained. Moreover, the sealing-compound constituent for liquid crystal display cells which is excellent in spreading workability that mass average molecular weight considers as less than 10,000 multiple-valued (meta) acrylate carries out real reservation and is desirable. [0040] As multiple-valued (meta) acrylate, for example, 1, 3-butylene glycol, 1,4-butanediol, 1,5-pentanediol, 3-methyl-1,5-pentanediol, 1,6-hexanediol, neopentyl glycol, 1, 8-octanediol, 1, 9-nonane diol, tricyclodecane dimethanol, ethylene glycol, Di(meth)acrylate, such as a polyethylene glycol, propylene glycol, and a polypropylene glycol. The di(meth)acrylate of tris (2-hydroxyethyl) isocyanurate. The di(meth)acrylate of the diol which added and obtained ethyleneoxide or propylene oxide four mols or more to one mol of neopentyl glycol, bisphenol A --- and --- or the di(meth)acrylate of the diol which added and obtained ethyleneoxide or propylene oxide two mols or more to one mol of Bisphenol F or bisphenol A D --- JI or Tori (meta) acrylate of triol which added and obtained ethyleneoxide or propylene oxide three mols or more to one mol of trimethylol propane. The Tori (meta) acrylate of triol which added and obtained ethyleneoxide or propylene oxide four mols or more to one mol of tris phenols. Tris(2-hydroxyethyl)isocyanurate tri(meth)acrylate, TORIMECH roll pro pantry (meta) acrylate, pen TAERISURITORUTORI (meta) acrylate. The Pori (meta) acrylate of dipentaerythritol, caprolactone denaturation tris [(meta) acryloxyethyl] isocyanurate. The Pori (meta) acrylate of alkyl denaturation dipentaerythritol. The Pori (meta) acrylate of caprolactone denaturation dipentaerythritol. Hydroxypivalate neopentylglycol acrylate, caprolactone denaturation hydroxypivalate neopentylglycol acrylate. Ethyleneoxide denaturation phosphoric-acid (meta) acrylate, ethyleneoxide denaturation alkylation phosphoric-acid (meta) acrylate, etc. are raised. In addition, polyester poly (meta) acrylate, polyether poly (meta) acrylate, polyether ester polyurethane (meta) acrylate, epoxy poly (meta) acrylate, etc. are desirable examples.

[0041] moreover, as a radical polymerization nature monofunctional monomer which comes to contain the activity silyl radical denaturation alkyl group shown by said formula (1) the approach of making the isocyanate silane compound of an initial complement act to the radical polymerization nature monofunctional monomer which has a hydroxy group in intramolecular out of said acrylate (meta) oligomer carried out, and introducing a silyl radical denaturation alkyl group [ activity / above ] --- or As opposed to the acrylate oligomer which has a carboxyl group in intramolecular (meta) As opposed to the acrylate oligomer which the glycidyl silane compound of an initial complement is made to act, and has the amino group of the 1st class and/or the 2nd class in the aforementioned approach of introducing an activity silyl radical denaturation alkyl group and also intramolecular (meta) As opposed to the approach of making the glycidyl silane compound of an initial complement act, and introducing a silyl radical denaturation alkyl group [ activity / above ], and the acrylate oligomer which has a glycidyl group or an oxirane ring machine in intramolecular (meta) How to make the amino silane compound of an initial complement act, and introduce a silyl radical denaturation alkyl group [ activity / above ], Or the acrylate oligomer which has an isocyanate radical in intramolecular (meta) is received. It is represented by what was obtained by either, such as the approach of making the amino silane compound and/or mercapto silane compound of an initial complement act, and introducing a silyl radical denaturation alkyl group [ activity / above ], and is good as those one sort or two sorts or more.

[0042] the aforementioned radical polymerization nature monofunctional monomer --- and --- or (meta) already pass the well-known purification approach in acrylate oligomer, respectively --- especially the thing to do for the selection use of what was high-grade-ized is desirable. Although there is nothing especially as the purification approach for the high-grade-izing what is

limited, you may be a molecular distillation method, a pure-water cleaning method, a high vacuum degassing method, a solvent extraction process, etc., for example. [0043] What is necessary is just to carry out, for example especially as an approach of asking for the class and its content rate of acrylate (meta) oligomer in the resin constituent for the liquid crystal closures in the condition of this application of not hardening, combining suitably the solvent extraction isolating method, a nuclear-magnetic-resonance spectrum method of identification (it only being called below an NMR spectrum method of identification), the gas chromatography method, the distillation isolating method, etc., although it does not restrain, moreover, the hardening --- as an approach of asking for the class and its content rate of acrylate (meta) oligomer in the living body, you may carry out, for example, combining suitably the cracked gas chromatography-mass-spectrum method, the solid-state NMR method, etc. As a (2) light radical initiator of the publication by <(2) radical photoinitiator> this application, although there is especially no limitation, and a well-known radical photoinitiator may already be used, it is good to carry out selection use of the radical photoinitiator which takes out an activity radical with light absorption preferably. Liquid crystal degradation by optical exposure can be substantially controlled by carrying out selection use of the radical photoinitiator which takes out an activity radical with light absorption, and it is desirable.

[0044] Especially as a concrete example of a radical photoinitiator, although it does not restrain For example, a benzoin, benzyl, benzoin methyl ether, an acetophenone, 2-hydroxy - 2-methyl-1-phenyl propane-1-ON, oligo - 2-hydroxy-2-methyl-1-[4-(1-methylvinyl) phenyl] propane, 1-(4-isopropyl phenyl)-2-hydroxy-isobutane-1-ON, A 4-(2-hydroxy ethoxy) phenyl-(2-hydroxy-2-propyl) ketone, A 1-hydroxy cyclohexyl phenyl ketone, 2, 2-dimethoxy-2-phenyl acetophenone, A 2 and 2-dimethoxy-2-phenyl acetophenone, 2-methyl-1-[4-(methythio) phenyl]-2-mol HONIRU propane-1-ON, 2-benzyl-2-dimethylamino - 1-(4-mol HONIRU phenyl)-Butane-1-ON, A benzophenone, 4, and 4'-bis(dimethylamino) benzophenone, 4'-bis(dimethylamino) benzophenone, N, and N-dimethylamino acetophenone, 2-methylanthraquinone, 2-ethyl anthraquinone, 2, 4-diethylthio xanthone, 2, 4-diisopropyl thioxan ton, bis(2, 4, 6-trimethyl benzoyl) phenyl phosphorotetted hydrogen oxide, Bis(eta5-2, 4-cyclopentadiene-1-IRU) bis[2 and 6-difluoro-3-(1H-BIRORU-1-IRU) phenyl] titanium, 1 and 7, 7-trimethyl -2 and 3-diketone JISHIKURO (2, 2, 1-heptane) etc. can be mentioned. You may use combining these one sort or two sorts or more. As an especially desirable radical initiator, it is oligo. - They are 2-hydroxy-2-methyl-1-[4-(1-methylvinyl) phenyl] propane and 2-benzyl-2-dimethylamino - 1-(4-mol HONIRU phenyl)- It is butane-1-ON, 1 and 7, and 7-trimethyl -It is good to consider as one sort chosen from 2 and 3-diketone JISHIKURO (2, 2, 1-heptane).

[0045] As for the (2) radical photoinitiator, it is important to make it contain in the range of 0.1 \*\* 10 mass % with the content of the resin constituent for the liquid crystal closures of this invention. The more desirable blending ratio of coal is the range of 1 thru/or 5 mass %. By carrying out to more than 0.1 mass %, by giving a substantial photoresist to the resin constituent for the liquid crystal closures, and carrying out to below 10 mass %, the handling stability and seal property balance of the resin constituent for the liquid crystal closures can be secured substantially, and it is desirable.

[0046] What is necessary is just to carry out, for example especially as an approach of asking for the class and its content rate of (2) radical photoinitiator in the resin constituent for the liquid crystal closures in the condition of this application of not hardening, combining suitably the solvent extraction isolating method, an NMR spectrum method of identification, an ultraviolet absorption spectrum method of identification, etc., although it does not restrain, moreover, the hardening --- as an approach of asking for the class and its content rate of (2) radical photoinitiator in the living body, you may carry out, for example, combining suitably the cracked gas chromatography-mass-spectrum method, the solid-state NMR method, etc.

As (3) organic peroxide of the publication by <(3) Organic peroxide> this application, although there is especially no limitation, it is good that it shall be 120 degrees C or more as half-life temperature is low, and it may already carry out selection use of the well-known thing for 10 hours. It has the advantage which it is hydroperoxides to consider as one sort chosen as the more desirable thing from dialkyl peroxide or hydroperoxides at best especially preferably, and is



easy to acquire little hardening object of the pot-life fitness at the time of being blended with base resin liquid, and hardening nonuniformity.

[0047] As an example of dialkyl peroxide, di-*t*-butyl peroxide, *t*-butyl- $\alpha$ -cumyl peroxide, *G* isopropyl peroxide, 1, and 3-bis[(*t*-butyl dioxo) isopropyl] benzene, 1, and 4-bis[(*t*-butyl dioxo) bis(tert-butyl peroxide)-2, the 5-dimethyl-2, 5-(tert-butyl peroxide) hexane, 2, the 5-dimethyl-2, 5-bis(tert-butyl peroxide)-3-hexyne, etc. are mentioned.

[0048] Moreover, as an example of hydroperoxides, *t*-butyl hydroperoxide, cumene hydroperoxide, diisopropylbenzene hydronalium peroxide, *p*-menthane hydroperoxide, 2,5-dimethylhexane-2,5-dihydroperoxide, 1,1,3,3-tetramethylbutyl hydroperoxide, etc. are mentioned. It is an example with the most desirable cumene hydroperoxide also in hydroperoxides.

[0049] Moreover, in the resin constituent for the liquid crystal closures of this application, it is an especially desirable mode that (3) organic peroxide is cumene hydroperoxide at the above mentioned appearance.

[0050] As for the (3) organic peroxide, it is important to make it contain in the range of 0.01 \*\* 10 mass % with the content of the resin constituent for the liquid crystal closures of this invention. The more desirable blending ratio of coal is the range of 1 thru/or 5 mass %. By carrying out to more than 0.01 mass %, by giving substantial thermosetting to the resin constituent for the liquid crystal closures, and carrying out to below 10 mass %, the handling stability and seal property balance of the resin constituent for the liquid crystal closures can be secured substantially, and it is desirable.

[0051] What is necessary is just to carry out, for example especially as an approach of asking for the class and its content rate of (3) organic peroxide in the resin constituent for the liquid crystal closures in the condition of this application of not hardening, combining suitably the solvent extraction isolating method, an NMR spectrum method of identification, the high-vacuum-distillation isolating method, etc., although it does not restrain, moreover, the hardening -- as an approach of asking for the class and its content rate of (3) organic peroxide in the living body, you may carry out, for example, combining suitably the cracked gas chromatography-mass-spectrum method, the solid-state NMR method, etc.

[0052] In addition, like (3) organic peroxide described above in this invention, when its \*\*\* pyrolyzes, even if it is using together with an alternative of (3), or (3) one or more sorts chosen from the well-known matter which may generate an activity radical, for example, a disulfide compound, a tetrasulfide compound, a benzoin and its derivative, an azo compound, etc. within limits which do not injure the operation effectiveness of this invention, it is preferably included by this invention.

[0053] As a disulfide compound, it is good as already well-known matter, is represented by tetramethylthiuramdisulfide, a tetraethylthiuram disulfide, tetra-propyl thiuram disulfide, and dipentamethylenethiuramtetrasulfide as for example, a rubber vulcanizing agent, and is represented by already well-known in the photoinitiator field as a benzoin compound. Moreover, it is good as matter by a benzoin, benzoin ethyl ether, benzoin iso-propyl ether, etc.

[0054] As an azo compound, moreover, 2 and 2'-azobis (4-methoxy-2,4-dimethylvaleronitrile), -azobis (2,4-dimethylvaleronitrile), and 2 and 2', 2'-azobis (2-methyl propionitrile), -azobis (2-methylbutyl nitril), and 2 and 2', 1'-azobis (cyclohexane-1-carbonitrile). The azonitrile represented by 1-[(1-cyano-1-methylethyl) azo] formamide, 2-phenylazo-4-methoxy-2,4-dimethylvaleronitrile, etc. 2 and 2'-azobis (2-methyl-N-phenyl propionamidin) dihydrochloride, 2 and 2' azobis [ - ] [N-(4-chlorophenyl)-2-methylpropionamidin] dihydrochloride, 2 and 2' azobis [ - ] [N-(4-hydroxyphenyl)-2-methylpropionamidin] dihydrochloride, 2 and 2' azobis [ - ] [2-methyl-N-(4-phenylmethyl) propionamidin] dihydrochloride, 2 and 2' azobis [ - ] [2-methyl-N-(2-propenyl) propionamidin] dihydrochloride, 2 and 2'-azobis (2-methylpropionamidin) dihydrochloride, 2 and 2' azobis [ - ] [N-(2-hydroxyethyl)-2-methylpropionamidin] dihydrochloride, 2 and 2' azobis [ - ] [2-(5-methyl-2-imidazoline-2-IRU) propane] dihydrochloride, 2 and 2' azobis [ - ] [2-[1-(2-hydroxyethyl)-2-imidazoline-2-IRU] propane] dihydrochloride, The azo amides represented by 2 and 2'-azobis [2-(2-imidazoline-2-IRU) propane] etc. The alkyl azo compounds represented by - azobis (2, 4, and 4-trimethyl pentane),

and 2 and 2', 2'-azobis (isobutane) etc. dimethyl-2, 2'-azobis (2-methyl propionate), and 2 and 2'-azobis (4-SHIANOBA relic -- acid), and 2', 2'-azobis [2-(hydroxymethyl) propionate] etc. can be illustrated. [ in addition, ]

[0055] Although especially (4) elastomers given in <(4) Elastomer> this invention do not add constraint, they mean the rubber component which has the softening temperature temperature of 0 degree C or less at the softening temperature temperature searched for by Torsional Braid Analyzer (only referred to as TBA below.) which twists and is called pendulum method, moreover, the thing made to contain the (4) elastomer in the state of a distributed particle in the resin constituent for the liquid crystal closures of this application -- it may be made to dissolve and you may make it contain it is more desirable to make it contain in the state of distribution preferably. Moreover, as a diameter of a distributed primary particle, it is in that case. 0.1 thru/or 5 micrometers of things preferably set to 0.2 thru/or 2 micrometers are good. That is, it is good for (4) elastomers to consider as the constituent which comes to carry out selection use of the elastomer which can take the so-called sea / island structure in the resin constituent for the liquid crystal closures of this application (B). When mean particle diameter sets to 0.1 micrometers or more, spreading workability can be held, high adhesion dependability is acquired by being referred to as 5 micrometers or less, and it is desirable. It is the range of 1 thru/or 30 mass %, and it is the content rate of occupying in the resin constituent for the liquid crystal closures (A), and it is [ the amount of the elastomer used can give substantial toughness to the resin constituent for the liquid crystal closures of this application (B) by making it contain more than 1 mass % and ] desirable. Moreover, the resin constituent for the liquid crystal closures of this application (B) can secure high heat-resistant one and high adhesive balance by carrying out to below 30 mass %, and it is desirable. Especially a desirable content rate is the range of 5 thru/or 20 mass %.

[0056] Although the example of (4) elastomers is shown below, this application is not restrained in the example. As a concrete example, the following liquid rubber or rubber-like particles are illustrated.

<Liquid rubber> Especially as the liquid rubber, although constraint is not added, it is represented by liquid polybutadiene [ of the following which may have one sort or two sorts or more of functional groups chosen from isocyanate, epoxy vinyl, carboxyl, hydroxy \*\* amino etc. ], liquefied acrylonitrile-butadiene copolymer resin, liquefied polyisoprene, liquefied polybutene, and liquefied poly ethylene propylene rubber, liquefied isobutylene isoprene rubber, a liquefied polyisobutylene, the liquefied chloroprene, etc., for example.

[0057] <Rubber-like particle> Although constraint is not added to especially the rubber-like particle, the following instantiation matter which has at least one sort of labile radicals chosen from a silyl radical, the amino group, an imino group, a sulfinyl group, a vinyl group, an isopropenyl radical, the allyl group, the peroxide radical, the methacrylate radical, the acrylate radical, etc. near the particle front face, and may be is mentioned preferably.

[0058] For example, an acrylic rubber particle, a silicone rubber particle, a conjugated diene system rubber particle, an olefin system rubber particle, a polyester system rubber particle, a polyurethane rubber particle, a compound-ized rubber particle, etc. can be illustrated. [0059] The more desirable example of a these rubber-like particle is shown below.

[0060] As a more desirable concrete example of a <acrylic rubber particle> acrylic rubber particle For example, the approach using the particle from which the core section is obtained by drying the core / shell mold emulsion which consists of acrylic rubber. Moreover, the approach using the rubber-like particle distributed epoxy resin constituent to which it comes to carry out the nonaqueous distribution polymerization of the acrylic monomer in an epoxy resin. In an epoxy resin, furthermore, rubbery polymer. The rubber-like particle distributed epoxy (meta) acrylate-ized constituent to which it makes it come further to add [ the acrylic acid (meta) of an initial complement ] the rubber-like particle distributed epoxy resin constituent to which it comes to carry out the nonaqueous distribution polymerization of one sort of the well-known monofunctional (meta) acrylate which can be given, or the two sorts or more. The acrylic rubber polymer solution which comes to introduce the approach of using, and a partial saturation vinyl group, an acrylate (meta) radical and the functional group that reacts is separately thrown in or



dropped after adjustment and into the aforementioned (1) (meta) acrylate resin. It mixes mechanically and there is desolventization or an approach using the resin constituent which makes it graft-size and makes it come stably to distribute this acrylic rubber particle in acrylate (meta) resin.

[0061] It is an approach, for example, using a powder-like silicone rubber particle as the more desirable example of a <silicone rubber particle> silicone rubber particle, and its example of a content resin constituent.

[0062] Moreover, the approach of using as the silicone rubber distributed epoxy acrylate-sized resin group resin constituent which was made to prepare and carry out the distributed polymerization of vinyl silicon and the hydrogen silicon, and was obtained after making the silicon macro monomer which introduces a double bond into an epoxy resin and has in it the piece end acrylate radical in which the double bond and reaction are possible react.

[0063] The approach using the silicone rubber particle which was made to carry out the nonaqueous distribution polymerization of one sort or two sorts or more, and silicon macro monomer of well-known monofunctional (meta) acrylate which can give rubbery polymer, and was obtained.

[0064] It is represented with said silicon macro monomer by the liquefied matter in which the piece end functional group of the liquefied silicone oil represented by for example, poly dimethylsiloxane, a poly methylphenyl siloxane, and the poly diphenyl siloxane has one sort of radical active groups chosen from the acrylate (meta) radical, the vinyl group, the aryl group, etc. here. It is good for the functional-group equivalent to consider as the range of 200 thru/or 10000, and the object which is in 300 thru/or 5000 more preferably as a desirable silicon macro monomer, moreover, a straight chain-like polysiloxane inactive at the silicon macro monomer -- and -- or it is more desirable to consider as the matter which the abundance of an annular polysiloxane makes-izing [ matter ] to zero come [ high grade ] infinite that it is high below 5 mass %.

[0065] As a more desirable concrete example of a <conjugated diene system rubber particle> conjugated diene system rubber particle, a polymerization or the conjugated diene rubber-like particle obtained by copolymerizing can illustrate monomers, such as 1,3-butadiene, 1, 3-pentadiene, an isoprene, 1, 3-hexadiene, and a chloroprene, it is good by the well-known object, and there is already especially no constraint, for example. A commercial item can also be used as it is. As an example of more concrete conjugated diene rubber, there are a copolymer of a butadiene and acrylonitrile, a copolymer of the butadiene and acrylonitrile which have a carboxyl group at the end, a copolymer of the butadiene and acrylonitrile which have an amino group at the end, etc.

[0066] As a concrete example of a <olefin system rubber particle> olefin system rubber particle, the particle which consists of an independent amorphous polymer or copolymers with other copolymerizable monomers, and terpolymers, such as ethylene, a propylene, 1-butene, 2-butene, and isobutene, or its constituent can be illustrated, for example. The resin constituent which the object marketed in forms, such as an olefin rubber latex, comes to hand [ constituent ], and dehydration processing is carried out [ constituent ] in acrylate (meta) resin, and comes to carry out distributed stabilization of the olefin rubber into acrylate (meta) resin can be illustrated.

[0067] A <polyester system rubber particle> polyester system rubber particle is a particle which becomes a polymer frame from the rubbery polymer which polyester association contains, and there is especially no constraint. If the example of a concrete polyester system rubber particle is given, for example Liquefied polysiloxane diol. At least one sort of diol components chosen from liquefied polyolefine diol, the polypropylene glycol, the polybutylene glycol, etc., The need is accepted. Under coexistence of the polyhydric-alcohol compound more than triol An adipic acid. The low softening temperature polyester particle guided from at least one sort of dibasic acid chosen from the maleic acid, the succinic acid, the phthalic acid, etc., Moreover, the low softening temperature polyester particle made to guide from the low softening temperature polyester particle which used the acid anhydride instead of or hydroxy polyvalent carboxylic acid etc. can be illustrated. [ said dibasic acid ]

[0068] A <polyurethane rubber particle> polyurethane rubber particle is a particle which becomes

a rubbery polymer frame from the rubbery polymer which the urethane bond and/or the urea bond contain, and there is especially no constraint. The diol component which will consist of at least one sort chosen from liquefied polysiloxane diol, liquefied polyolefine diol, the polypropylene glycol, the polybutylene glycol, etc. if the example of a concrete polyurethane rubber particle is given. The need is accepted. Under coexistence of the polyhydric-alcohol compound more than triol Hexamethylene diisocyanate. The polyurethane-rubber particle which the diisocyanate compound represented with isophorone diisocyanate, tolylene diisocyanate, diphenylmethane diisocyanate, norbornane diisocyanate, etc. is made to act, and is obtained is mentioned.

[0069] Furthermore, for example, the polyurethane-rubber particle which at least one sort of long-chain diamine components chosen from liquefied polysiloxane diamine, liquefied polyolefine diamine, polypropylene-glycol diamine, etc. and the already well-known diisocyanate compound represented with hexamethylene diisocyanate, isophorone diisocyanate, tolylene diisocyanate, diphenylmethane diisocyanate, norbornane diisocyanate, etc. under coexistence of the multiple-valued amine compound more than triamine if needed are made to act, and is obtained can be illustrated.

[0071] The particle which consists of the graft polymer and/or block polymer which consist of two or more sorts of the acrylic described above, for example, a silicon system, a conjugated diene system, an olefin system, a polyester system, and an urethane system as a <compound-ized rubber particle> compound-ized rubber particle or a core shell polymer, a double layer polymer, etc. can be illustrated.

[0072] the resin constituent for the liquid crystal closures of this invention (B) --> (4) elastomers -- this hardening among this constituent, although what holds the configuration as a particle to either of in the living body is desirable As an approach of distinguishing in advance, whether it may exist as a particle How to make the mixture of the (1) (meta) acrylate and the rubber-like particle which do not have muddiness, for example, to observe this constituent with an optical microscope, and to check existence of a rubber-like particle although there is especially no constraint, Or the approach of carrying out the osmic-acid stain color sensitizing of the minute cutting plane of the hardening object which ultraviolet rays or the light was made to irradiate and was acquired under the inert gas ambient atmosphere, and carrying out scanning electron microscope (TEM) observation, Or the approach of carrying out transmission electron microscope (SEM) observation, the approach of carrying out micro IR measurement and distinguishing the micro layer of a hardening object, etc. can adopt suitably.

[0073] moreover, as an approach of grasping the class, its amount, and particle diameter of (4) elastomers in the resin constituent for the liquid crystal closures of this invention (B) Although it does not limit especially, the hardening object is adjusted or extracted, for example. In parallel with the approach of carrying out an osmic-acid stain color sensitizing, and TEM-observing or SEM observing about the fracture intercept, and SEM observation, it obtains with an element distribution analysis image. Identification and the approach of carrying out a quantum, Or the approach of giving selectivity by the well-known approach, and TEM-observing or SEM observing a hardening body surface after ETCHING. The approach of carrying out micro infrared-absorption-spectrum (micro [ IR ]) measurement, and distinguishing a micro layer, the approach of carrying out heat radiation of the micro layer, and identifying and distinguishing the type-of-gas component which carries out decomposition generating, the method of converting from the volume specific volume of a micro layer, and asking for a mass ratio, etc. may be combined suitably, and may be performed.

[0074] As long as it is usually what [ thing ] is usable as a bulking agent in the electronic ingredient field at (5) bulking agents used for the resin constituent for the liquid crystal closures

of <(5) Bulking agent> this application (c), it may be minerals, or may be the quality of organic, or any are sufficient. Although it does not restrain especially, as an example of a minerals bulking agent, a calcium carbonate, a magnesium carbonate, a barium sulfate, magnesium sulfate, an aluminum silicate, zirconium silicate, ferrous oxide, titanium oxide, an aluminum oxide (alumina), a zinc oxide, a silicon dioxide, potassium titanate, a kaolin, talc, asbestos powder, quartz powder, mica, a glass fiber, etc. are mentioned, for example.

whereas a desirable minerals bulking agent is a high grade silica and/or high purity alumina, or titanium oxide.

[0076] It is good for the amount of total of the content of the alkali metal for which it asked by the atomic absorption analysis of a wet degradation object to use especially 50 ppm or less 30 ppm or less as a high grade silica and/or high purity alumina, or titanium oxide 15 ppm or less more preferably. When the resin constituent hardening object for the liquid crystal closures of this application contacts liquid crystal by doing so, shift of the isolation ion to a liquid crystal phase can be inhibited. There is especially no constraint in the purification approach for setting the amount of total of the content of alkali metal to 50 ppm or less, for example, it can be water-solution-ized in the phase of a manufacture raw material to it, and can be obtained by the manufacture purification approaches, such as an ion-exchange method purification method, to it. [0077] Moreover, as for a minerals bulking agent, what has a 99-% of the weight particle diameter value on the weight \*\*\*\* curve for which it asked with the laser method particle diameter measuring instrument of 632.8nm wavelength (d99) in 5 micrometers or less is desirable, and what is the range whose weighted mean particle diameter values (d50) shown with the 50-% of the weight value on a mass \*\*\*\* curve are 0.005 thru/ or 1 micrometer is more desirable. [0078] When (d99) generally uses the minerals bulking agent which is 5 micrometers or less, the dimensional stability of the gap width of face of a liquid crystal panel improves further and is desirable.

Moreover, it is good as one sort chosen from the hard acrylic resin powder represented by polymethylmethacrylate etc., hard urethane powder, hard polyester powder, hard epoxy resin powder, hard phenol resin powder, etc. as a concrete example of an organic bulking agent, or two sorts or more.

Minerals bulking agent and the organic bulking agent, or two sorts or more.

1 thru/or 30 mass % with the content mass ratio in the resin constituent for the liquid crystal materials (C). Spreading does and is desirable, without being able to secure the fluidity of a constituent by being able to improve screen-stencil or dispenser spreading workability by carrying out to more than 0.1 mass %, and carrying out to below 30 mass %, and occurring the slip or dispenser plugging at the time of screen-stencil frequently. The range of 5 thru/or 30 mass % is especially desirable.

082] Moreover, although it does not restrain especially when (5) bulking agents are minerals  
bulking agents, it is desirable to make it graft—ization—denaturalize and to use it the back by (7)  
ane coupling agents mentioned later in advance.

bulking agent. As for the rate of graft-izing, it is desirable in that case that it is expressed with the mass rate of increase for which it asked with repeat solvent cleaning, and 1 thru/ or 20 mass % of the 100 mass % per silane coupling agent of a minerals bulking agent is usually combined chemically.

resin constituent for the liquid crystal closures of this invention, although it does not strain, you may carry out, for example, combining suitably the filtration isolating method, an X-diffraction spectral method, an elemental-analysis method, a heating incineration residue method, a wet pyrolysis-atomic absorption method, a heating incineration residue analysis method, etc., and there is especially no limitation.

agent  $i$  is carried out, grant agent  $j$  is carried out, and if agent  $i$  is carried out, grant agent  $j$  is carried out correctly by 3 thru/ or width

of face of 7 micrometers about the gap width of a liquid crystal display component and are such, either the quality of organic or minerals can use it.

thru/or 30 mass % to come out comparatively into the resin constituent for the liquid crystal closures of this invention (C) if needed, and to make it contain suitably. Loadings are the range of 0.5 thru/or 2.5 mass % more preferably.

SEM image analysis method, this TEM image analysis method, the method according to \*\*\*\*\* the cracked gas chromatography method, a heating residue-fluorescence-X-rays diffraction method, an elemental-analysis method, etc. are mentioned, and especially limitation may be performed by combining suitably.

thermosetting polymer particles for four directions, such as deformation, the shape of a real ball and Rugby ball-like particle which is not dissolved and swollen, and cylindrical fiber, are mentioned by for example, (1) liquefied (meta) acrylate as a grant agent.

all alumina particle, a glass staple fiber, a metal staple fiber, a metal powder, etc. are mentioned as an example of a grant agent.

Moreover, the gap appearance of the quality of organic — as a grant — a thermosetting polystyrene real ball-like particle — in addition, a phenol resin system heat-curing particle, a benzoguanamine resin system heat-curing particle, etc. are mentioned as more desirable example.

minerals carry out gap appearance, and since the grant agent is controllable with high degree of accuracy in gap precision, it is an especially desirable example of a mode.

constituent for the liquid crystal closures of <7> Silane coupling agent> this application (D), and is good for it as already well-known matter. The desirable content rate is 0.1 thru/or 3 mass % except for the part for the above mentioned minerals bulking agent surface treatment (graft). If it can secure the adhesive property over a glass substrate by the use more than 0.1 mass % and uses it more than exceeding 3 mass %, the remarkable operation effectiveness cannot be pulled out any more. It is 0.5 thru/or 3 mass % preferably.

one compound can be mentioned, for example, gamma-vinyl propyltrimethoxysilane, gamma-vinyl propyl triethoxysilane, gamma-acryloyl propylmethoxysilane, gamma-acryloyl propyltrimethoxysilane, gamma-acryloyl propylmethoxysilane, gamma-acryloyl propyl triethoxysilane, gamma-methacryloyl propylmethoxysilane, gamma-methacryloyl propyltrimethoxysilane, gamma-methacryloyl propylmethoxysilane, gamma-methacryloyl propyl triethoxysilane, gamma-glycidyloxy propyltrimethoxysilane, gamma-glycidyloxypropyltrimethoxysilane, Gamma-ethylmethoxysilane, gamma-glycidyloxypropyltrimethoxysilane, Gamma-

ethyl dimethoxysilane, gamma-aminopropyl triethoxysilane, gamma-aminopropyl methyldimethoxysilane, gamma-aminopropyl trimethoxysilane, gamma-glycidoxy propyltriethoxysilane, gamma-aminopropyl methyldimethoxysilane, gamma-aminopropyl triethoxysilane, N-aminoethyl-gamma-imino propylmethoxydimethoxysilane, N-aminoethyl-gamma-aminopropyl trimethoxysilane, N-aminoethyl-gamma-aminopropyl diethoxysilane and N-phenyl-gamma-aminopropyl trimethoxysilane, N-phenyl-gamma-aminopropyl triethoxysilane and N-phenyl-gamma-aminopropyl methyl dimethoxysilane, N-phenyl-gamma-aminopropyl methyltrimethoxysilane, gamma-mercaptopropylmethyl dimethoxysilane, gamma-aminopropyl trimethoxysilane, gamma-mercaptopropylmethyl diethoxysilane, gamma-mercaptopropyl triethoxysilane, gamma-isocyanate propyl triethoxysilane, etc. can be illustrated. Especially, one sort chosen from gamma-vinyl propyltrimethoxysilane, gamma-acryloyl propyltrimethoxysilane, gamma-methacryloyl propyltrimethoxysilane, and gamma-isocyanate propyl triethoxysilane or two sorts or more are more desirable.

and what is necessary is just to carry out, for example especially as an approach of asking for

the class and its content rate of a silane coupling agent in the resin constituent for the liquid crystal closures in the condition of this application of not hardening (D), combining suitably the solvent extraction isolating method, an NMR spectrum method of identification, the gas chromatography method, the distillation isolating method, etc., although it does not restrain. moreover, the hardening — as an approach of asking for the class and its content rate of a silane coupling agent in the living body, you may carry out, for example, combining suitably the decomposition gas-chromatograph-mass-spectrum method, the solid-state NMR method, etc. [0095] In the resin constituent for the liquid crystal closures of <(8) WATTUKUSU> this application (E), well-known (8) waxes already contain, use of the wax — if it carries out comparatively — the inside of the resin constituent for the liquid crystal closures (E) — 0.1 — or 3 mass % content of is done. After holding the adhesive property of this sealing-compound constituent by carrying out to below 3 mass % more than 0.1 mass %, the property of air-dried nature can be promoted to coincidence, and it is desirable. Air-dried nature means that the hard facing nature of the air contact sealing surface obtained as a result of oxygen hardening active jamming suppression is high.

[0096] Especially as an approach of asking for the content rate of the wax in the resin constituent for the liquid crystal closures of this application, although it does not restrain, the cracked gas chromatography method, a solid-state nuclear-magnetic-resonance spectral method, a hydrocarbon solvent extraction-judgment quantum, etc. are mentioned, for example. [0097] As (8) waxes given in this application, there is especially no limitation and it can use any wax. For example, an animal system natural wax, a vegetable system natural wax, a mineral system natural wax, a petroleum system wax, a synthetic hydrocarbon system wax, a denaturation wax, a hydrogenation wax, etc. are mentioned. [0098] Also in this, 30-degree-C or more wax 150 degrees C or less has the desirable melting point, and paraffin wax, carnauba wax, and a micro crystallin wax are more desirable. [0099] moreover — the resin constituent for the liquid crystal closures of this application which makes it come to contain a wax — the condition before hardening — setting — a wax — a distributed condition — and — or you may make it exist in the condition of having made it dissolving, and there is especially no constraint.

[0100] The more concrete example of (8) waxes is shown below. [0101] (Animal system natural wax) For example, beeswax, spermaceti wax, a shellac low, etc. are mentioned. [0102] (Vegetable system natural wax) For example, carnauba wax, a cage curie wax, a candelilla wax, haze wax, a KEN wax, etc. are mentioned. [0103] (Mineral system natural wax) For example, a montan wax, an ozokerite, a ceresin, etc. are mentioned.

[0104] (Petroleum system wax) For example, paraffin wax, a micro crystallin wax, etc. are mentioned.

[0105] (Synthetic hydrocarbon system wax) for example, Fischer — fatty tuna — a push wax and its derivative, polyethylene wax and its derivative, a polypropylene wax, its derivative, etc. are mentioned.

[0106] (Denaturation wax) For example, an oxidation wax, a montan wax, an acid denaturation wax, etc. are mentioned.

[0107] (Hydrogenation wax) For example, amide waxes, such as an octadecanamide wax, a polyester wax, an opal wax, etc. are mentioned.

[0108] As especially most desirable wax, they are paraffin wax or carnauba wax. [0109] The resin constituent for the liquid crystal closures of <(9) radical-polymerization inhibitor> this invention may be made to already use together well-known (9) radical-polymerization inhibitor suitably if needed. Although it does not restrain especially, as an example, the polyhydric-phenol compound represented by hydroquinone, methyl hydroquinone, ethyl hydroquinone, t-butyl hydroquinone, hydroquinone methyl ether, hydroquinone ethyl ether, G t-butyl-p-cresol, a catechol, t-butyl catechol, etc., for example, phenothiazin, the Lynn system compound represented by triphenyl phosphate and diphenyl isodecyl phosphate are mentioned.

[0110] As for the (9) radical-polymerization inhibitor, it is desirable to make it contain at a rate of 0.001 thru/or 1 mass % in the resin constituent for the liquid crystal closures given in this invention. Loadings are the range of 0.01 thru/or 0.1 mass % more preferably. It is said within the limits, and it can be compatible by making it contain in the viscosity stability at the time of storage of the resin constituent for the liquid crystal closures, and the radical hardenability at the time of an optical exposure, and is desirable.

[0111] The resin constituent for the liquid crystal closures of <(10) transition-metals non-\*\* agent> this invention may be made to already use together suitably a well-known (10) transition-metals non-\*\* agent if needed. Although it does not restrain especially, as an example, a hydroxyphenyl propionyl hydrazine compound, an acetylacetone, etc. which are represented with N and N' bis[ — ] [3-(3, 5-G t-butyl-4-hydroxyphenyl) propionyl] hydrazine etc. can be illustrated.

[0112] Moreover, in the resin constituent for the liquid crystal closures of this application, (11) conductivity BISU etc. may be further used together suitably in the range which does not spoil the operation effectiveness of this invention remarkably if needed.

[0113] Especially as the conductive bead, although it does not restrain, mean particle diameter is 3 thru/or 10 micrometers, for example, and it is desirable that the minimum particle diameter considers [ the maximum particle diameter ] as a conductive bead 0.1 micrometers or more by 10 micrometers or less. 1 thru/or 15 mass % coming out comparatively, and making it contain to resin constituent 100 mass % for the liquid crystal closures of this application — it is desirable, and things can give a function anisotropic conductive by doing so, and are desirable. A vertical conductivity function can be given by the use more than 1 mass %, and it is desirable. Moreover, it is desirable from reservation of an insulating property both horizontal (right and left) inter-electrode with carrying out to under 15 mass % improving. It is the range of 2 thru/or 10 mass % more preferably. Moreover, especially as a conductive bead kind, although it does not restrain, a concrete example is shown below. For example, you may be a noble-metals particle, a precious alloy particle, a base-metal particle, a base-metal alloy particle, other metallic-coating mold organic substance particle metallurgy group covering form insulation inorganic particles, etc. (Noble metals) For example, gold, silver, platinum, etc. can be illustrated.

(Precious alloy) For example, a silver copper alloy, a golden copper alloy, a golden silver alloy, a platinum silver alloy, a golden platinum alloy, a gold-nickel alloy, a silver nickel alloy, etc. can be illustrated.

(Base metal) For example, copper, nickel, tin, a tungsten, etc. can be illustrated.

(Base-metal alloy) For example, copper nickel alloys, a copper-tin alloy, a pewter, etc. can be illustrated.

(Metallic-coating mold organic substance particle) For example, the thing which makes it come to form said conductive metallic film in the organic polymer particle represented with polystyrene or a polymethyl methacrylate is a typical example. As a commercial item, from the Sekisui fine chemical company, a trade name "micro pearl AU series" is known, and it can be preferably used for this invention.

[0114] (Metallic-coating mold insulation inorganic particle) For example, the thing which makes it come to form said conductive metallic film in the minerals particle of high insulation represented with a mica or a glass bead is a typical example. As said conductive bead, it is the point which the primary distribution stability tends to secure, and 1 thru/or especially the example of a mode of which 7 volume % content is done is desirable at a rate of occupying a metallic-coating mold organic substance particle in a radical hardenability 2 liquid base resin mold sealing-compound constituent constituent given in this invention. It is most desirable to consist of at least one sort of metallic-coating phases as which (k) conductivity bead had an organic polymer in the heart, and was especially chosen from gold, silver, a golden copper alloy, a silver copper alloy, nickel, or those alloys with the radical hardenability 2 liquid base resin mold sealing-compound constituent given in this invention.

[0115] The mean particle diameter of the conductive bead is good to consider as the above mentioned range, and it is because mean particle diameter is hard to pull out a good vertical flow property in use of a thing 1 micrometer or less even if a conductive particle remains in inter-

electrode, and is because it will be easy to become a short cause if that to which mean particle diameter or the maximum particle diameter exceeded 10 micrometers is used on the other hand. [0116] next -- the liquid crystal display cel manufacture approach of this application -- the resin constituent for the liquid crystal closures of this application -- using -- as the substrate for liquid crystal cells used by the liquid crystal display cel manufacture approach of this invention again -- a plastic plate -- and -- or although it is good and does not restrain especially for a glass substrate, as a plastic plate kind, the product made from polyester, the product made from polyarylate, the product made from a polycarbonate, the product made from polyether sulfone, etc. are illustrated preferably, for example, the orientation film represent with said substrate group carried out with the transparent electrode represent with indium oxide , polyimide , etc. as a matter of course -- in addition , the color coat film , an overcoat , a thin-film transistor ( TFT ) , and the so-called substrate for a liquid crystal cell configuration with which the need section , in addition to this , come to construct a minerals ion screen etc. be use further preferably if needed , and the liquid crystal display cel configuration with which the need be restrain at all by the configuration kind on a substrate

[0117] With the liquid crystal display cel manufacture approach of this application manufacture approach> this invention glass [ the inside of the opposite substrate which faces, and one of ] -- and -- or to the junction seal configuration part of the substrate for liquid crystal display cells made from plastics To claim 1 thru/or claim 12, either After applying the liquid crystal closure resin constituent of a publication in the shape of a frame, Furthermore, the liquid crystal of mass required for a liquid crystal display cel configuration is dropped at one arbitrary locations of a seal within the limit of the liquid crystal display cel configuration substrate in front of lamination. And two substrates which counter are stuck under a high vacuum, the bottom of un-heating -- the back It is stuck by pressure so that it may become a homogeneous cel gap 0.2 thru/or in 7 micrometers. After that, After passing through the process which makes ultraviolet rays or the light irradiate from outside, and stiffens the resin constituent for the liquid crystal closures, it is the liquid crystal display cel manufacture approach characterized by manufacturing a liquid crystal display cel through a less than 130-degree C accelerated curing by heating hardening process or a liquid crystal homogeneity reorientation process.

[0118] Moreover, although it is good and does not restrain especially for a plastic plate and/or a glass substrate as a substrate for liquid crystal cells used by the liquid crystal display cel manufacture approach of this invention, as a plastic plate kind, the product made from polyester, the product made from polyarylate, the product made from a polycarbonate, the product made from polyether sulfone, etc. are illustrated preferably, for example. The orientation film represented with the above mentioned substrate group as a matter of course with the transparent electrode represented with the indium oxide film or tin oxide-indium oxide bipolar membrane, polyimide, etc., In addition, the color coat film, an overcoat, a thin-film transistor (TFT), and the so-called substrate for a liquid crystal cell configuration with which the need section, in addition to this, comes to construct a minerals ion screen etc. are used further preferably if needed. The liquid crystal display cel manufacture approach of this application is not restrained at all by the configuration kind on a substrate.

[0119] Moreover, by the liquid crystal display cel manufacture approach of this application is not class of liquid crystal ingredient used does not receive constraint of this application, the carry out selection use in the light of the purpose of a liquid crystal display component at arbitration and dares illustrate an already well-known ingredient as a liquid crystal kind which can be used, a nematic liquid crystal, strong dielectric liquid crystal, etc. will be raised as a desirable example.

[0120] moreover, glass [ which counters by the liquid crystal display cel manufacture approach of this invention / of two sheets ] -- and -- or although carried out using the substrate for liquid crystal display cells made from plastics, this invention does not receive constraint at all according to the head end process in connection with the object pair substrate.

[0121] Moreover, although the liquid crystal of mass required for a liquid crystal display cel configuration is dropped at one arbitrary locations of a seal within the limit of the liquid crystal

display cel configuration substrate in front of lamination and is carried out by the liquid crystal display cel manufacture approach of this invention although especially the standard of the dropping liquid crystal mass per one cel does not limit, if it sets to 100 the amount of theories of computation of the cel-ized liquid crystal inclusion body product which it is going to obtain -- the range of 95 thru/or 110 -- it is more preferably good the range of 97 thru/or 105, and to consider as the range of 99 thru/or 102 most preferably. Moreover, there is no constraint in the location dropped within the seal limit in any way, and dropping is good also as two or more drops of two or more drops also as one drop. There is especially no limitation that what is necessary is just to set the dropping number and a dropping location as arbitration according to the magnitude of a display panel, the viscosity of the liquid crystal itself, etc.

[0122] The liquid crystal display component pass the liquid crystal display cel manufacture approach of this application described above as the liquid crystal display component of <liquid crystal display component> this invention is meant. It is not restrained by the class or approach of a process before and after concerning with the above mentioned cel production process in that case. There is no constraint also in a liquid crystal ingredient.

[0123] As a desirable liquid crystal display component of this invention, for example Em Shut (M Schadt) and W The liquid crystal device of TN mold (Twisted Nematic) which HERUFURHHI and others (W Helfrich) advocated, or the liquid crystal device of a STN mold (Super Twisted Nematic). Or it is mentioned as an example with desirable strong dielectric mold liquid crystal device advocated by Clerks (N A Clark) and Lagerwall (S T Lagerwall), liquid crystal display component which prepared the thin film transistor (TFT) in each pixel. [0124]

[Example] Hereafter, although the typical example and the example of a comparison explained this invention to the detail, it was not limited to this. % of a publication among an example and the section mean mass % and the mass section, respectively. The approach of the evaluation trial performed in the example and the example of a comparison is shown.

[0125] (Workability trial with \*\*) The resin constituent for the liquid crystal closures of each example with which it comes to secure the liquid crystal non-stain resistance by which seal preservation of the 5ml each was carried out as test fluid to 10mL capacity mold dispenser container made from polyethylene below the freezing point was taken out, respectively, and it returned to the room temperature of 25 degrees C over 2 hours. Five 300mm successive lines were drawn to the glass substrate by per second 50mm as a spreading linear velocity using the liquid which became 25 degrees C, and spreading fitness was judged from the spreading configuration.

O : seal piece -- although it oozes, there is no \*\* and there is no fitness \*\*: seal piece -- bleeding -- taking out -- \*\* -- it sees slightly.

x: Spreading fitness since the cobwebbing has occurred is a problem. (20 degree-CE mold viscosity property of each base resin liquid constituent) 25-degree-C viscosity at the time of rotor rotation 0.5rpm by E mold viscometer of the resin constituent for the liquid crystal closures of each example is read. Furthermore, it asked for the CHIKUSO characteristic from the ratio with the 5rpm viscosity. In addition, it was presupposed that a measurement result is shown as follows.

x(-): It is the case where 25-degree-C viscosity is under 100Pa and s, and flow nature is too high and cohesive force is missing. it is the case where 25-degree-C viscosity is 1000 or more Pa-s, and cohesive force x(+): is strong at the time of a sticking-by-pressure seal -- elapsing -- GYUPPU appearance -- carrying out -- poor viscosity.

O For 100 or more and the range O(+):25-degree-C viscosity of less than 200 Pa-s, 501 or more and the range O-25-degree-C viscosity of less than 1000 Pa-s are [ (-):25 degree-C viscosity ] 201 or more and the range of less than 500 Pa-s [0126]. (Heat deflection temperature of a hardening object) The resin constituent for the liquid crystal closures of each example was applied by 100-micrometer thickness in thickness on the smooth mold releasing film, and heat care of health was further carried out at 120 degrees C under nitrogen-gas-atmosphere mind after the 3000mj exposure under the inert gas ambient atmosphere for 2 hours by making the

visible ray of 405nm wavelength into addition exposure EMERUGI. Then, the wafer (15mmx4mm) of the obtained hardening film was started, and TMA (Thermomechanical analysis) measurement of this hardening object was carried out under the temperature up 5 degrees C/m from -30 degrees C to 150 degrees C. The amount point of inflection of distortion was made into the heat deflection temperature (Tg) of the hardening object.

[0127] (Liquid crystal non-stain resistance trial -1) Liquid crystal resistivity change is measured in order to verify whenever [ effect / on the liquid crystal which the non-hardened resin constituent for the liquid crystal closures gives ]. The resin constituent for the liquid crystal closures of each example is enclosed into a brown bottle with a mass ratio with liquid crystal 1:10, the resistivity of liquid crystal \*\*\*\* which was made to carry out contact neglect and was obtained the back under the 2-hour room temperature is measured, and the rate of change to the liquid crystal resistivity before contamination is measured.

x(-): O when x(+)/specific-resistance rate of change is [ for specific resistance rate of change / in a certain case / \*\*specific resistance change ] 0.75 or more-time 2 thru/or less than 10 times, or less than 0.1 times 0.1 or more times 10 or more times in a certain case: When specific resistance change is under 2 double or less than 0.75 times (liquid crystal non-stain resistance trial -2), measure liquid crystal resistivity change in order to verify whenever [ effect / on the liquid crystal which the resin constituent for the liquid crystal closures of a hardened material gives ]. 0.5g of resin constituents for the liquid crystal closures of each example is extracted to the glassware of 10ml capacity, and by making the visible ray of 405nm wavelength into addition exposure EMERUGI, after making the bottom of an inert gas ambient atmosphere carry out a 3000mj exposure, heat care of health was further carried out at 120 degrees C after sealing under nitrogen-gas-atmosphere mind in it for 2 hours. Then, liquid crystal was \*\*\*\*\*(ed) and a hardening object and liquid crystal were contacted so that it might be set to 1:10 with a mass ratio with liquid crystal. A pan is carried out at 80 degrees C by the condition for 24 hours, after cooling under a room temperature, liquid crystal \*\*\*\* is extracted and the resistivity is measured. In addition, as a blank (blank test) used as contamination classes, with the liquid crystal item, the bulging trial was carried out at 80 degrees C for 24 hours, and the rate of a liquid crystal specific resistance value change which the resin constituent hardening object for the liquid crystal closures of each of said example at the time of setting the liquid crystal resistivity to 100 gives was computed. In addition, the formula of the rate of change is as follows.

[0128] Specific resistance rate-of-change =(resistivity after contacting hardening object and liquid crystal)/(resistivity obtained by the blank test)

x Specific resistance rate of change 10 or more times (-) : A certain case x (+) : specific resistance rate of change -- 0.1 or more times -- a certain case -- \*\*:specific resistance change -- 2 -- or As opposed to the glass liquid crystal display cel of each manufactured example when it is 0.75 or more-time less than 10 times or less than 0.1 times and O:specific resistance change is under 2 double or less than 0.75 times (generating existence of seal pass and carrying out non-stain appearance sex test), pass a cel chemically-modified [ under the conditions shown in each example ] degree -- The deflecting plate was further stuck on both the front-side and the rear-side for the existence of generating of seal pass after operation with the magnifier, the white light was applied from the rear-side, the hue near [ in a liquid crystal display cel ] the sealing compound was observed, and the evaluation judging of the non-blot \*\*\*\*\* of a sealing compound was performed.

O : there is no generating of seal pass and generating of display nonuniformity is not seen within 100 micrometers.

O x as which display nonuniformity is slightly regarded within 500 micrometers in the distance of a from in the seal case of a cel periphery although there is no generating of seal pass : there is seal pass. Or although there is no seal pass, display nonuniformity amounted to 500 micrometers or more at the seal time, and the fall of a display function has generated it remarkably.

[0129] (Seal functional durability test) the glass liquid crystal display cel which carried out non-stain appearance and which was obtained like the sex test -- the bottom of 65 degrees C / RH95% of ambient atmosphere -- 500 hours -- said -- it took out after neglect for 1,000 hours,

respectively, and the deflecting plate was stuck on both the front-side and the rear-side, the white light was applied from the rear-side, the hue near [ in a liquid crystal display cel ] the sealing compound was observed, and the evaluation judging of the non-blot \*\*\*\*\* of a sealing compound was performed.

O xdisplay nonuniformity as which Odisplay nonuniformity as which generating of display nonuniformity is not regarded within 200 micrometers is slightly regarded within 500 micrometers in the distance of a from in the seal case of a cel periphery -- the seal time -- 500 micrometers or more -- and the raw-material kind (abridged notation) which the fall of a display function has generated remarkably and which was used among the example again is as follows.

[0130] As a [use raw-material etc. radical polymerization] nature monofunctional monomer, 2-hydroxypropyl methacrylate which is a reagent (best) was prepared. Moreover, as an activity silyl radical denaturation alkyl group content radical polymerization nature monofunctional monomer, the reaction addition object (one mol of isocyanate ethyl methacrylate which it comes to contain with a silicon atom content 7.65%, and one mol) (M2) of gamma-mercaptopropyltrimethoxysilane was prepared. Moreover, as liquefied (meta) acrylate oligomer, the following synthetic example 1 thru/or the synthetic example 5, and the example 1 of comparison composition were adjusted, respectively.

[0131] [The synthetic example 1]

The synthetic agitator of activity silyl radical denaturation alkyl group denaturation epoxy methacrylate (O-1). The 500ml 4 opening flask equipped with gas installation tubing, the thermometer, and the cooling pipe is prepared. Bisphenol A mold epoxy resin:Epilcon EXA850CRP [the Dainippon Ink & Chemicals, Inc. make] 200g, Methacrylic acid : 96g, triethanolamine:0.2g, methyl hydroquinone 0.1g, Toluene 1000g is mixed and heating stirring of the dry air is carried out at 110 degrees C under bubbling for 22 hours. Later, After cooling to a room temperature, the sodium-hydroxide water solution of the decinormal equivalent to the number of mols of the unreacted methacrylic acid which recognizes little existence very much was added into this system, 100g of ultrapure water was added further, and lower layer water was

after standing was carried out, two-layer separation was carried out, and lower layer water was removed, furthermore, actuation of adding 100g of ultrapure water, mixing for 10 minutes, carrying out after standing, carrying out two-layer separation, and removing lower layer water -- after 20 times repeat operation -- 80-degree C warming, under the bottom high vacuum, desolventization was made to complete and bisphenol A mold epoxy methacrylate was obtained.

[0132] The bisphenol A mold epoxy methacrylate had hydroxyl in intramolecular, to the 98 sections, it is the rate of the two sections of gamma-isocyanate propyl triethoxysilane, and to the bottom of nitrogen-gas-atmosphere mind, was made to react at 80 degrees C for 2 hours, and adjusted activity silyl radical denaturation alkyl group denaturation epoxy methacrylate (O-1). In addition, as a result of infrared-absorption-spectrum analysis, it was admitted that the infrared absorption spectrum of 2300cm<sup>-1</sup> of a proper had disappeared completely on the isocyanate radical, and, as for this product, it became clear from the result that the silyl radical denaturation alkyl group was introduced into the intramolecular of bisphenol A mold epoxy methacrylate oligomer, about [ moreover, / the value (0.22 mass %) which it expresses with content mass % of a silicon atom, and the value calculated with elemental-analysis assay is

proved as an activity silyl radical denaturation alkyl group content in \*\* (meta) acrylate oligomer that it is 0.2 mass % and is computed from a preparation presentation, and ] -- I did one. [0133] Moreover, the resistivity of the obtained activity silyl radical denaturation alkyl group denaturation epoxy methacrylate (O-1) was 6.1x108ohm and cm.

[0134] [The synthetic example 2]

Having added 500g of Epilcon 830S, 100g [ of ADEKA EP4000S ], 10g [ of methacrylic acids ], and triethanolamine 1g, and toluene 50g as a 2 functionality epoxy resin, and introducing air into the 2000ml 4 opening flask equipped with the synthetic agitator of a rubber-like particle content epoxy methacrylate resin constituent (O-2), gas installation tubing, the thermometer, and the cooling pipe, it was made to react at 120 degrees C for 1 hour, and the double bond was introduced. Next, made it react at 70 degrees C for 3 hours, it was made to react at 90 more degrees C for 1 hour, having added butyl acrylate 350g, glycidyl methacrylate 20g, divinylbenzene



1g. azobis dimethylvaleronitrile 1g. and azobisisobutyronitril 2g. and introducing nitrogen in the system of reaction, and the rubber-like particle content flexibility epoxy resin constituent (E-1) which the 0.5-micrometer fine bridge formation mold acrylic rubber particle distributed to homogeneity was obtained. The content of a rubber particle is 38 mass % from a preparation ratio.

[0135] subsequently — the (E-1) — the 500 sections — another agitator, gas installation tubing, and a thermometer — 121g of methacrylic acids which it makes it come to contain is \*\*\*\*\* (ed). the inside of the 2000ml 4 opening flask equipped with the cooling pipe — taking — beforehand — phenothiazin 0.5% — After performing an addition reaction at 120 degrees C for 18 hours, introducing air and cooling to a room temperature, the sodium-hydroxide water solution of the decinormal equivalent to the number of mols of the unreacted methacrylic acid which recognizes little existence very much is added into this system. Furthermore, 100g of ultrapure water was added, it mixes for 10 minutes, after standing was carried out, two-layer separation was carried out, and lower layer water was removed, furthermore, actuation of adding 100g of ultrapure water, mixing for 10 minutes, carrying out after standing, carrying out two-layer separation, and removing lower layer water — after 15 times repeat operation — 80-degree C warming — the epoxy methacrylate resin constituent (O-2) which was made to complete desolventization under a bottom high vacuum, and the 0.5-micrometer fine bridge formation mold acrylic rubber particle distributed to homogeneity was obtained. In addition, the rubber dispersed particle diameter made photo-curing catalyst's existence-ization cure these some constituents fast at low temperature, and was measured by the approach of observing the fracture surface mol follow G of the hardened material with an electron microscope, and measuring distributed rubber particle diameter. The fine bridge formation mold methacrylic rubber particle content computed from the amount of preparation monomers and a residual monomer was proved that it is 29.5 mass %.

[0136] Moreover, the softening temperature of the fine bridge formation mold acrylic rubber particle which covered over which and asked TBA for said epoxy methacrylate resin constituent hardening object showed -42 degrees C. The resistivity of the obtained denaturation rubber-like particle content epoxy methacrylate (O-2) was 8.4x107ohm and cm. [0137] [The synthetic example 3]

As opposed to the 95 sections of the rubber-like particle content epoxy methacrylate resin constituent (O-2) obtained in the synthetic example 2 of the synthetic above of a radical denaturation alkyl group denaturation rubber-like particle content epoxy methacrylate resin constituent (O-3) activity silyl — the five sections of gamma-isocyanate propyl triethoxysilane come out comparatively, and it reacts to the bottom of nitrogen-gas-atmosphere mind at 80 degrees C for 2 hours — making — activity — silyl radical denaturation alkyl group denaturation rubber-like particle content epoxy methacrylate (O-3) [— the methacrylic rubber particle content obtained 280 mass %]. In addition, as a result of infrared-absorption-spectrum analysis, it was admitted that the infrared absorption spectrum of 2300cm<sup>-1</sup> of a proper had disappeared completely on the isocyanate radical, and, as for this product, it became clear from the result that the silyl radical denaturation alkyl group was introduced into the intramolecular of denaturation epoxy methacrylate oligomer, about [ moreover, / the value (0.54 mass %) which the analysis quantum assay as an activity silyl radical denaturation alkyl group content in \*\* (meta) acrylate oligomer is 0.5 mass %, and was computed from the preparation presentation, and ] — it was the result of doing one.

[0138] Moreover, the resistivity of the obtained activity silyl radical denaturation alkyl group denaturation rubber-like particle content epoxy methacrylate (O-3) was 7.9x107 ohm-cm. [0139] [The synthetic example 4]

an activity silyl radical — having added 1000g [ of ADEKA EP4023S ], 94g [ of methacrylic acids ], and triethanolamine 0.4g. and toluene 100g as a 2 functionality flexibility epoxy resin, and introducing air into the 2000ml 4 opening flask equipped with the synthetic agitator of a denaturation alkyl group denaturation rubber-like particle content flexibility epoxy methacrylate resin constituent (O-4), gas installation tubing, the thermometer, and the cooling pipe, it was

made to react at 120 degrees C for 1 hour, and the double bond was introduced. Next, the rubber-like particle content flexibility epoxy resin constituent (p1-2) which was made to react at 70 degrees C for 3 hours, was made to react at 90 more degrees C for 1 hour, and the 0.8-micrometer fine bridge formation mold acrylic rubber particle (h1) distributed to homogeneity was obtained, having added 2-ethylhexyl acrylate 520g, glycidyl methacrylate 12g, divinylbenzene 4g, azobis dimethylvaleronitrile 2g, and azobisisobutyronitril 2g, and introducing nitrogen in the system of reaction. The content of a rubber particle is 34.8 mass % from a monomer preparation ratio, subsequently — the (P1-2) — the 825 sections — another agitator, gas installation tubing, and a thermometer — After performing an addition reaction at 120 degrees C for 15 hours, taking in the 2000ml 4 opening flask equipped with the cooling pipe, \*\*\*\*\* (ing) 63.5g of methacrylic acids which make it come in advance to contain hydroquinone 1000ppm, and introducing air, Actuation of adding 100g of ultrapure water, mixing for 10 minutes, carrying out after standing after cooling and into this resultant system to a room temperature, carrying out two-layer separation, and removing lower layer water after 50 times repeat operation 80-degree C warming — the flexible epoxy methacrylate resin constituent (E-4) which was made to complete desolventization under a bottom high vacuum, and performed detoluene to the bottom of reduced pressure under this temperature, and the 0.8-micrometer fine bridge formation mold acrylic rubber particle (h1) distributed to homogeneity was obtained. In addition, the rubber dispersed particle diameter made photo-curing catalyst's existence-ization cure these some constituents fast at low temperature, and was measured by the approach of observing the fracture surface mol follow G of the hardened material with an electron microscope, and measuring distributed rubber particle diameter. The fine bridge formation mold methacrylic rubber particle content computed from the amount of preparation monomers and a residual monomer was proved that it is 32.2 mass %.

[0140] Moreover, the softening temperature of the fine bridge formation mold acrylic rubber particle which covered over which and asked TBA for said epoxy methacrylate resin constituent hardening object showed -51 degrees C. [0141] to the 95 sections of a rubber-like particle content epoxy methacrylate resin constituent (E-4), the five sections of gamma-isocyanate propyl triethoxysilane come out comparatively, and it reacts to the bottom of nitrogen-gas-atmosphere mind at 80 degrees C for 2 hours — making — activity — silyl radical denaturation alkyl group denaturation rubber-like particle content epoxy methacrylate (O-4) [— the methacrylic rubber particle content adjusted 30.6 mass %]. In addition, as a result of infrared-absorption-spectrum analysis, it was admitted that the infrared absorption spectrum of 2300cm<sup>-1</sup> of a proper had disappeared completely on the isocyanate radical, and, as for this product, it became clear from the result that the silyl radical denaturation alkyl group was introduced into the intramolecular of denaturation epoxy methacrylate oligomer. Moreover, as an activity silyl radical denaturation alkyl group content in \*\* (meta) acrylate oligomer, it expressed with content mass % of a silicon atom, and was 0.5 mass %.

[0142] Moreover, the resistivity of the obtained activity silyl radical denaturation alkyl group denaturation rubber-like particle content epoxy methacrylate (O-4) was 2.2x108 ohm-cm. [0143] [The synthetic example 5]

The synthetic agitator of high grade-ized bis-female mold epoxy methacrylate (O-5), the 500ml 4 opening flask equipped with gas installation tubing, the thermometer, and the cooling pipe — preparing — bisphenol female mold epoxy resin: — [ by Epilcon EP-830S(Dainippon Ink & Chemicals, Inc. 200g Methacrylic acid : 108g, triethanolamine:0.5g, methyl hydroquinone 0.3g. Toluene 1000g is mixed and heating stirring of the dry air is carried out at 125 degrees C under bubbling for 12 hours. Later, After cooling to a room temperature, the sodium-hydroxide water solution of the decinormal equivalent to the number of mols of the unreacted methacrylic acid which recognizes little existence very much was added into this system, 100g of ultrapure water was added further, it mixes for 10 minutes, after standing was carried out, two-layer separation was carried out, and lower layer water was removed, furthermore, actuation of adding 100g of ultrapure water, mixing for 10 minutes, carrying out after standing, carrying out two-layer separation, and removing lower layer water — after 20 times repeat operation — 80-degree C warming, under the bottom high vacuum, desolventization was made to complete and high grade-

ized bis-female mold epoxy methacrylate (O-5) was obtained.

[0144] Moreover, the resistivity of the obtained high grade-sized bis-female mold epoxy methacrylate (O-5) was 7.3x108 ohm-cm.

[0145] [The example 1 of comparison composition]

The synthetic example agitator of epoxy methacrylate ONOGOMA (O-6), gas installation tubing. The 500ml 4 opening flask equipped with the thermometer and the cooling pipe is prepared. Bisphenol female mold epoxy resin:Epilcon EP 830 [the Dainippon Ink & Chemicals, Inc. make] 200g, Methacrylic acid : 108g, triethanolamine:0.5g, and 0.3g and toluene 100g of methyl hydroquinone are mixed. Heating stirring of the dry air is carried out at 125 degrees C under bubbling for 12 hours. Later, Cool to a room temperature and toluene 900g and 100g of ultrapure water are added in this resultant system. actuation of mixing for 10 minutes, carrying out after standing, carrying out two-layer separation, and removing lower layer water --- after 3 times repeat operation --- 80-degree C warming --- desolvationization was made to complete under a bottom high vacuum, and the epoxy methacrylate by which it comes to introduce an average of 1.98 methacrylate radicals into an average of 1 molecule was obtained. Consequently, the resistivity of the obtained epoxy methacrylate oligomer (O-6) was 1.9x102 ohm-cm, and was a resin constituent which lacks in an electrical insulating characteristic a little.

[0146] As <other acrylate (meta) oligomer> and also acrylate (meta) oligomer of \*\* They are an addition denaturation object and methyl methacrylate (as polymerization inhibitor) about six mols of propylene oxide (PO) to one mol of bisphenol A. The denaturation bisphenol A mold dimethacrylate which was made to carry out esterification exchange reaction and was guided is purchased. a methyl hydroquinone --- 1000 ppm --- containing --- With having created the 3 thru/or 500g of 4 time dilution xylene solutions, and having indicated the dilute solution for said synthetic example 1, by the same purification approach (purification method which repeats actuation of adding 100g of ultrapure water, mixing for 10 minutes, carrying out after standing, carrying out two-layer separation, and removing lower layer water, 20 times) After processing, PO denaturation bisphenol A mold epoxy methacrylate in which finally carries out vacuum desolvationization and it comes [ high grade ]-izing [ methacrylate ] was prepared. in addition --- this --- the specific resistance of PO denaturation bisphenol A mold epoxy methacrylate it comes [ high grade ]-izing [ methacrylate ] was 6.1x108 ohm-cm.

[0147] Moreover, trimethylolpropane triacrylate (1000 ppm of hydroquinone methyl ether are contained as polymerization inhibitor) is purchased similarly. With having created the 3 thru/or 500g of 4 time dilution xylene solutions, and having indicated the dilute solution for said synthetic example 1, by the same purification approach (purification method which repeats actuation of adding 100g of ultrapure water, mixing for 10 minutes, carrying out after standing, carrying out two-layer separation, and removing lower layer water, 20 times) After processing, Finally vacuum desolvationization was carried out and the trimethylolpropane triacrylate which degree[ of high pure ]-comes to turn was prepared. In addition, the specific resistance of this trimethylolpropane triacrylate that degree[ of high pure ]-comes to turn was 4.9x108ohm and cm.

[0148] As <organic peroxide> organic peroxide, selection use of the Mitsui Chemicals cumene hydroperoxide was carried out.

[0149] As a <radical photoinitiator> radical photoinitiator, it is 2-benzyl-2-dimethylamino -1, -(4-mol HONIRU phenyl)- The Ciba-Geigy product (trade name: IRGACURE 369) which is butane-1-ON was used.

[0150] As a <minerals bulking agent> amorphous silica, the Shin-etsu chemical and a trade name "MU-120" (primary average grain size of 0.07 micrometers for which it asked by the electron microscope observational method) as a spherical silica --- Tatsumoni and a trade name --- "6 mass % dry type processing filler [ of the gamma-methacryloyl propyltrimethoxysilane of ADOMA fine SO-EI ] --- it is only referred to as SO-EI-6 below --- The high-purity-alumina complications [cable address:AL-2] (what carried out silanizing of the importation) and the particle talc of a domestic product d50 is 0.2 micrometers as an amorphous alumina, and gamma-methacryloyl propyltrimethoxysilane comes to carry out 6 mass % dry type processing were prepared, respectively.

[0151] The gamma-methacryloyl propyltrimethoxysilane of <silane coupling agent> marketing or gamma-isocyanate propyl triethoxysilane was purchased, and it used as it is.

[0152] It indicated in the example of a <wax>.

[0153] It indicated in the example of <radical polymerization inhibitor>.

[0154] It indicated in the example of a <transition-metals non-\*\* agent>.

[0155] The 70 sections of the activity silyl radical denaturation alkyl group denaturation epoxy methacrylate (O-1) obtained in the example 1 of [example 1] composition, PO denaturation bisphenol A mold epoxy methacrylate carries out gap appearance the 30 sections. 5-micrometer real ball-like silica powder the 1 section as a grant agent Preliminary mixing of the four sections of MU-120 which are an amorphous silica, and the 50 sections of AL-2 which are an amorphism alumina is carried out by the package Dalton mixer. Subsequently, after a solid-state raw material carries out kneading degassing processing with 3 rolls made from a ceramic until 3 micrometers or more are un-detecting. The 2.5 sections of cumene hydroperoxide and the 2.5 sections of IRGACURE 369 were added to the 95 mass %, it mixed with homogeneity, finally vacuum degassing processing was carried out, and the resin constituent for the liquid crystal closures of 1 acidity or alkalinity (R1) was obtained.

[0156] by the way, an organic peroxide content consists [ the minerals bulking agent content which carries out gap appearance of the R1 liquid 61.29% as an acrylate system oligomer content which comes to contain polymerization inhibitor (meta), and contains a grant agent / a radical photoinitiator ] of 2.50% 2.50% 33.71%. Moreover, as the so-called activity silyl radical denaturation alkyl group content expressed with silicon atom content mass % in the (meta) acrylate system component, it is 0.14%.

[0157] The glass-transition-temperature property of the liquid crystal non-stain resistance trial -1 to the spreading workability test result of R1 adjusted liquid, 20 degree-CE mold viscosity property difference, and the Chisso RC4087 liquid crystal and the liquid crystal gon-stain resistance trial -2, and R1 constituent hardening object was shown in Table 1.

[0158] The cylindrical syringe made from polyethylene with opaque 20ml capacity was filled up with 10ml of R1 liquid, degassing of the syringe contents was carried out again, and it set to the dispenser (shot master: product made from Musashi engineering) spreading machine.

[0159] Next, arrange a transparent electrode and the orientation film and three sets of glass substrates are prepared by a set of two the 3x4.5 inch size countered for [ which required pretreatment comes to complete ] glass liquid crystal display components pretreatment ending, among those, on the substrate side for fronts, the mask of the seal part was carried out, gap appearance was carried out as prior pretreatment, the 5-micrometer real ball-like silica powder which is a grant agent was sprayed, and front substrate side processing which it makes it come for 30 minutes to heat-treat at 120 degrees C was carried out.

[0160] Next, in the junction seal configuration part of the rear-side substrate side of the substrate for liquid crystal display cells, the drawing drawing of the R1 liquid was carried out to the shape of a frame without a break. However, it was made to become 0.25mm\*\*0.02mm width of face as non-hardened sealing-compound line breadth.

[0161] Next, a rear-side substrate is turned down and a front-side substrate is turned up, and after two or more drops of mass which is equivalent to the amount of count cel volume theory in RCby Chisso Corp. 4087 liquid-crystal ingredient within the seal limit of a rear-side substrate side was dropped near a rear-side substrate center, between both pairs substrates was changed into the high vacuum condition, and it was made to rival slowly in the form where the degree of vacuum encloses liquid crystal, covering the opposite substrate for 10 seconds after reaching 1Pa or less. Then, after making the gap between both the substrates that it applies for 15

seconds, and gap width of face pressurizes to 5 micrometers, and make a pair adjust, three sets (W1) of glass liquid crystal display cells were manufactured through the accelerated curing by heating process for 120 minutes in open aggressiveness, the process which carries out the 3000mj exposure of the light by the high pressure mercury vapor lamp in the amount of addition exposure energy further, and 120-degree C oven. In all the cells, neither seal pass nor seal generating flow is, and it became clear that liquid crystal leakage was not generated, either. The result of the display grace over W1 obtained cel and seal functional durability test was shown in



Table 1.

[0162] In the resin constituent for the liquid crystal closures adjusted in the [example 2] example 1 instead of the 70 sections of activity silyl radical denaturation alkyl group denaturation epoxy methacrylate (O-1), and the 30 sections of PO denaturation bisphenol A mold epoxy methacrylate. The 20 sections of activity silyl radical denaturation alkyl group denaturation epoxy methacrylate (O-1), it is made the same except having considered as the 75 sections of rubber-like particle content epoxy methacrylate (O-2), and the five sections of the reaction addition object (one mol of isocyanate ethyl methacrylate which it comes to contain with a silicon atom content 7.65%, and one mol) (M2) of gamma-mercaptopropyltrimethoxysilane. The resin constituent for the liquid crystal closures of 1 acidity or alkalinity (R2) was obtained.

[0163] by the way, an organic peroxide content consists [ the minerals bulking agent content which carries out gap appearance of the R2 liquid 13.55% as an elastomer component 47.74% as a liquefied (meta) acrylate quantitative formula which comes to contain polymerization inhibitor, and contains a grant agent / a radical photoinitiator ] of 2.50% 2.50% 33.71%. Moreover, as the so-called activity silyl radical denaturation alkyl group content expressed with silicon atom content mass % in the (meta) acrylate system component, it is 0.38%.

[0164] The glass-transition-temperature property of the liquid crystal non-stain resistance trial -1 to the spreading workability test result of R2 adjusted liquid, 20 degree-CE mold viscosity property difference, and the Chisso RC4087 liquid crystal and the liquid crystal non-stain resistance trial -2, and R2 constituent hardening object was shown in Table 1.

[0165] The cylindrical syringe made from polyethylene with opaque 20ml capacity is filled up with 10ml of the R2 liquid. Degassing of the syringe contents is carried out again. After setting to a dispenser (shot master; product made from Musashi engineering) spreading machine Liquid crystal display cel manufacture was similarly performed with having indicated in the example 1, in a glass liquid crystal display cel (W2), in three-set manufacture and its manufacture process, there are seal pass and no seal generating flow, and liquid crystal leakage was not observed at all, either. The display grace and the seal functional endurance test result to W2 obtained cel were shown in Table 1.

[0166] In the resin constituent for the liquid crystal closures adjusted in the [example 3] example 1 instead of the 70 sections of activity silyl radical denaturation alkyl group denaturation epoxy methacrylate (O-1), and the 30 sections of PO denaturation bisphenol A mold epoxy methacrylate. The 50 sections of activity silyl radical denaturation alkyl group denaturation epoxy methacrylate (O-1). The resin constituent for the liquid crystal closures of 1 acidity or alkalinity (R3) was similarly obtained except having considered as the 45 sections of activity silyl radical denaturation alkyl group denaturation rubber-like particle content epoxy methacrylate (O-3), and the five sections of trimethylolpropanetrimethacrylate.

[0167] by the way, an organic peroxide content consists [ the minerals bulking agent content which carries out gap appearance of the R3 liquid 7.72% as an elastomer component 53.57% as a liquefied (meta) acrylate quantitative formula which comes to contain polymerization inhibitor, and contains a grant agent / a radical photoinitiator ] of 2.50% 2.50% 33.71%. Moreover, as the so-called activity silyl radical denaturation alkyl group content expressed with silicon atom content mass % in the (meta) acrylate system component, it is 0.22%.

[0168] The glass-transition-temperature property of the liquid crystal non-stain resistance trial -1 to the spreading workability test result of R3 adjusted liquid, 20 degree-CE mold viscosity property difference, and the Chisso RC4087 liquid crystal and the liquid crystal non-stain resistance trial -2, and R3 constituent hardening object was shown in Table 1.

[0169] The cylindrical syringe made from polyethylene with opaque 20ml capacity is filled up with 10ml of the R3 liquid. Degassing of the syringe contents is carried out again. After setting to a dispenser (shot master; product made from Musashi engineering) spreading machine Liquid crystal display cel manufacture was similarly performed with having indicated in the example 1, in a glass liquid crystal display cel (W3), in three-set manufacture and its manufacture process, there are seal pass and no seal generating flow, and liquid crystal leakage was not observed at all, either. The display grace and the seal functional endurance test result to obtained W3 cel were shown in Table 1.

[0170] The 40 sections of the epoxy methacrylate (O-5) obtained in the example 5 of [example 4] composition, the activity silyl obtained in the synthetic example 4 -- a radical denaturation alkyl group denaturation rubber particle content flexibility epoxy methacrylate resin constituent (O-4) the 40 sections. The 18 sections of PO denaturation bisphenol A mold epoxy methacrylate, the two sections of 2-hydroxypropyl methacrylate monomer, gap appearance is carried out and SO-EI-6 which are the one section of 5-micrometer real ball-like silica powder and a spherical silica as a grant agent the 43.5 sections. The five sections of MU-120, the 0.5 sections of an average of 3-micrometer carnauba wax which comes to carry out fines processing. Preliminary mixing of the one section of gamma-isocyanate propyl triethoxysilane is carried out by the package Dalton mixer. Subsequently, after a solid-state raw material carries out kneading degassing processing with 3 rolls made from a ceramic until 3 micrometers or more are undetecting. The three sections of cumene hydroperoxide and the two sections of IRGACURE 369 were added to the 95 mass %, it mixed with homogeneity, finally vacuum degassing processing was carried out, and the resin constituent for the liquid crystal closures of 1 acidity or alkalinity (R4) was obtained.

[0171] by the way, an organic peroxide content consists [ the minerals bulking agent content of 56.85% and an elastomer which carries out gap appearance 7.75% and contains a grant agent / a radical photoinitiator ] of 3% 2% 0.32% of a wax 30.08% as an acrylate system oligomer content to which R4 liquid comes to contain polymerization inhibitor (meta). Moreover, as the so-called activity silyl radical denaturation alkyl group content expressed with silicon atom content mass % in the liquefied (meta) acrylate component, it is 0.2%.

[0172] The glass-transition-temperature property of the liquid crystal non-stain resistance trial -1 to the spreading workability test result of R4 adjusted liquid, 20 degree-CE mold viscosity property difference, and the Chisso RC4087 liquid crystal and the liquid crystal non-stain resistance trial -2, and R4 constituent hardening object was shown in Table 1.

[0173] The cylindrical syringe made from polyethylene with opaque 20ml capacity was filled up with 10ml of R4 liquid, degassing of the syringe contents was carried out again, and it set to the dispenser (shot master; product made from Musashi engineering) spreading machine.

[0174] Next, arrange a transparent electrode and the orientation film and three sets of clean TFT glass substrates are prepared by a set of two the 9x12 inch size countered for [ which required pretreatment comes to complete ] glass liquid crystal display components pretreatment ending, among those, on the substrate side for fronts, the mask of the seal part was carried out, gap appearance was carried out as prior pretreatment, the 5-micrometer real ball-like silica powder which is a grant agent was sprayed, and front substrate side processing which it makes it come for 30 minutes to heat-treat at 120 degrees C was carried out.

[0175] Next, in the junction seal configuration part of the rear-side substrate side of the substrate for liquid crystal display cels, the drawing drawing of the R4 liquid was carried out to the shape of a frame without a break. However, it was made to become 0.3mm\*0.02mm width of face as non-hardened sealing-compound line breadth.

[0176] Next, a rear-side substrate is turned down and a front-side substrate is turned up, and after the liquid crystal drop of the mass which is equivalent to the amount of count cel volume theory within the seal limit of a rear-side substrate side in the \*\* liquid crystal ingredient corresponding to TFT by Chisso Corp. was dropped near a rear-side substrate center, between both pairs substrates was changed into the high vacuum condition, and it was made to rival slowly in the form where the degree of vacuum encloses liquid crystal, covering the opposite substrate for 20 seconds after reaching 1Pa or less. Then, after making the gap between both the substrates that it applies for 30 seconds, and gap width of face pressurizes to 5

micrometers, and make a pair adjust, three sets (W4) of glass liquid crystal display cels were manufactured through the accelerated curing by heating process for 60 minutes in the process which carries out the 3000mj exposure of the light which comes to mask open aggressiveness and less than 385nm UV light which makes a high pressure mercury vapor lamp luminescence Hara further with addition exposure light energy, and 120-degree C oven. In all the cels, neither seal pass nor seal generating flow is, and it became clear that liquid crystal leakage was not generated, either. The result of the display grace over W4 obtained cel and seal functional

durability test was shown in Table 1.

[0177] Resin constituent R5 constituent for the liquid crystal closures which comes further to blend the 0.1 sections of N and N' bis[ - ] [3-(3, 5-G t-butyl-4-hydroxyphenyl) propionyl] hydrazine (Ciba-Geigy product) with the 100 sections of R1 which is the resin constituent for the liquid crystal closures adjusted in the [example 5] example 1 as a metal non-\*\* agent was adjusted.

[0178] The glass-transition-temperature property of the liquid crystal non-stain resistance trial -1 to the spreading workability test result of R5 adjusted liquid, 20 degree-CE mold viscosity property difference, and the Chisso RC4087 liquid crystal and the liquid crystal non-stain resistance trial -2, and R2 constituent hardening object was shown in Table 1.

[0179] The cylindrical syringe made from polyethylene with opaque 20ml capacity is filled up with 10ml of the R5 liquid. Degassing of the syringe contents is carried out again. After setting to a dispenser (shot master: product made from Musashi engineering) spreading machine Liquid crystal display cel manufacture was similarly performed with having indicated in the example 4, in a glass liquid crystal display cel (W5), in three-set manufacture and its manufacture process, there are seal pass and no seal generating flow, and liquid crystal leakage was not observed at all, either. The display grace and the seal functional endurance test result to W5 obtained cel were shown in Table 1.

[0180] The 90 sections of low epoxy methacrylate ONOGOMA (O-6) of whenever [ purification / which was obtained in the example 1 of the [example 1 of comparison] comparison composition ], PO denaturation bisphenol A mold epoxy methacrylate carries out gap appearance [ the 10 sections. 5-micrometer real ball-like silica powder the 1 section as a grant agent Preliminary mixing of the ten sections of P25 and the 14 sections of MU-120 which are titanium oxide is carried out by the package Dalton mixer. Subsequently, after a solid-state raw material carries out kneading degassing processing with 3 rolls made from a ceramic until 3 micrometers or more are un-detecting. The two sections of IRGACURE 369 were added to the 98 mass %, it mixed with homogeneity, finally vacuum degassing processing was carried out, and the resin constituent for the liquid crystal closures for the examples of a comparison of 1 acidity or alkalinity (Y1) was obtained.

[0181] by the way, an organic peroxide content consists [ the minerals bulking agent content which carries out gap appearance of the Y1 liquid 81.67% as an acrylate system oligomer content which comes to contain polymerization inhibitor (meta), and contains a grant agent ] of 2% 16.33%.

[0182] The glass-transition-temperature property of the liquid crystal non-stain resistance trial -1 to the spreading workability test result of Y1 adjusted liquid, 20 degree-CE mold viscosity property difference, and the Chisso RC4087 liquid crystal and the liquid crystal non-stain resistance trial -2, and Y1 constituent hardening object was shown in Table 1.

[0183] The cylindrical syringe made from polyethylene with opaque 20ml capacity is filled up with 10ml of the Y1 liquid. Degassing of the syringe contents is carried out again. After setting to a dispenser (shot master: product made from Musashi engineering) spreading machine Liquid crystal display cel manufacture was similarly performed with having indicated in the example 1, in a glass liquid crystal display cel (V1), in three-set manufacture and its manufacture process, there are seal pass and no seal generating flow, and liquid crystal leakage was not observed at all, either. The display grace and the seal functional endurance test result to V1 obtained cel were shown in Table 1.

[0184] As a [example 2 of comparison] bisphenol female mold epoxy resin, the 50 sections of [f] by Epilcon EP-830S[Dainippon Ink & Chemicals, Inc., As a latency curing agent for epoxy resins, the 15 sections of Ajinomoto product friend KYUA VDH (dihydrazide compound). As a latency hardening accelerator for epoxy resins, by the mol equivalent ratio of tolylene diisocyanate and dimethylamine with 1:2 addition products (the San Apro product / trade name: U-Cat5302T) The two sections of the an average of 3-micrometer \*\*\*\*\*. The 25 sections of low epoxy methacrylate ONOGOMA (O-6) of whenever [ purification / which was obtained in the example 1 of comparison composition ]. The 25 sections of PO denaturation bisphenol A mold epoxy methacrylate, the five sections of MU-120 which are an amorphism silica, d50 mean particle

diameter for which it asked from the \*\*\*\* curve carries out preliminary mixing of the 45 sections of 1-micrometer talc, and the two sections of gamma-glycidioxypropyltrimethoxysilane (Shin-etsu silicone company product, KBM403) by the package Dalton mixer. Subsequently, after a solid-state raw material kneads with 3 rolls made from a ceramic until 3 micrometers or more are un-detecting. To the 100 mass %, the two sections were added, photoinitiator 1-hydroxy cyclohexyl phenyl ketone was stirred, finally vacuum degassing processing was carried out, and 1 liquid type sealing-compound constituent (Y2) having the radical photoresist of 1 acidity or alkalinity and thermosetting was obtained.

[0185] Next, in order to present dispenser spreading, it filled up the cylindrical syringe made from polyethylene with opaque 20ml capacity with 10ml (Y2) of 1 liquid type sealing-compound constituents at a time, and set to the dispenser spreading machine made from shot master/Musashi engineering. Then, allot a transparent electrode, the orientation film, and a black matrix, and three sets of clean glass substrates are prepared by a set of two the 3x4.5 inch size countered for [ which required pretreatment comes to complete ] glass liquid crystal display components pretreatment ending, among those, on the substrate side for fronts, the mask of the seal part was carried out, gap appearance was carried out as prior pretreatment, the 4.5-micrometer real ball-like silica powder which is a grant agent was sprayed, and front substrate side processing which it makes it come for 30 minutes to heat-treat at 120 degrees C was carried out.

[0186] Next, the drawing drawing of the 1 liquid type sealing-compound constituent (Y2) was carried out to the shape of a frame without a break, respectively to the junction seal configuration part of the rear-side substrate side of the substrate for liquid crystal display cells. However, it was made to become 0.3mm\*\*0.02mm width of face as non-hardened sealing-compound line breadth, respectively.

[0187] Next, a rear-side substrate is turned down and a front-side substrate is turned up, and after the mass drop which is equivalent to the amount of count cel volume theory in RCby Chisso Corp. 4087 liquid-crystal ingredient within the seal limit of a rear-side substrate side was dropped near a rear-side substrate center, between both pairs substrates was changed into the high vacuum condition, and it was made to rival slowly in the form where the degree of vacuum encloses liquid crystal, covering the opposite substrate for 10 seconds after reaching 1Pa or less. It applied for 5 seconds after that, gap width of face pressurized to 4.5 micrometers, and three sets (V2) of liquid crystal display cells for the examples of a comparison were manufactured the back through the 2nd hardening care-of-health process for 120 minutes which carries out heat curing in open aggressiveness, the 1st hardening process which subsequently carries out the lighting exposure of the UV halogen lamp for 30 seconds, and 120-degree-C oven. Consequently, seal flow and seal pass were generated in all three cells, and the liquid crystal leakage by from near the transparent electrode lower part or the black matrix lower part was observed especially. \*\*\*\*\* to a reliability trial, although the display grace over V2 obtained was indicated to Table 1 --- it cut.

[0188]

[Table 1]

試験項目	試験条件										比較例	
	1	2	3	4	5	1	2	3	4	5	1	2
シール剤番号	R1	R2	R3	R4	R5	R6	R1	R2	R3	R4	R5	R6
遮光性試験結果	○	○	○	○	○	○	○	○	○	○	○	○
20℃型硬化特性	○	○	○	○	○	○	○	○	○	○	○	○
硬化後のTg(℃)	110	78	85	52	110	108	115	78	85	52	110	108
液晶表示特性試験-1	○	○	○	○	○	○	○	○	○	○	○	○
液晶表示特性試験-2	○	○	○	○	○	○	○	○	○	○	○	○
液晶表示セル番号	W1	W2	W3	W4	W5	V1	W1	W2	W3	W4	V1	V2
初期表示品位	○	○	○	○	○	○	○	○	○	○	○	○
シールバスの有無	無	無	無	無	無	無	無	無	無	無	無	有
シール割れの有無	無	無	無	無	無	無	無	無	無	無	無	有
液晶漏れの有無	無	無	無	無	無	無	無	無	無	無	無	有
表示品位耐久経時試験	○	○	○	○	○	○	○	○	○	○	○	×
500時間後	○	○	○	○	○	○	○	○	○	○	○	×
1000時間後	○	○	○	○	○	○	○	○	○	○	○	×

[0189]

[Effect of the Invention] The resin constituent for the liquid crystal closures of this invention is excellent in the following six requirements and \*\* liquid crystal non-stain resistance.

- \*\* Liquid crystal degradation suits few photo-curing systems.
- \*\* On the occasion of photo-curing, it can harden by the optical exposure of a low dose.
- \*\* Seal hardening of an optical protection-from-light part is possible.
- \*\* Excel in preservation stability, spreading dependability, and an adhesive property.
- \*\* The display grace of the obtained liquid crystal display component is excellent in dependability highly and over a long period of time.

It can be satisfied with coincidence.

[0190] Moreover, it is clear that the liquid crystal display component's manufactured by the so-called liquid crystal dropping method, using the resin constituent for the liquid crystal closures of the invention in this application excel in display grace and it is rich in endurance. Therefore, the liquid crystal display component of this invention can be used as a display of a cellular phone or mobile computing devices also in a heat-and-high-humidity situation.

[Translation done.]